

**The Development of Children's Ability to Delay
Gratification and Knowledge of Delay Strategies**

Sophie Slade

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ABSTRACT

THE DEVELOPMENT OF CHILDREN'S ABILITY TO DELAY GRATIFICATION AND KNOWLEDGE OF DELAY STRATEGIES

Sophie Slade

A developmental perspective was taken to investigate children's ability to delay gratification and their knowledge of delay facilitating and inhibiting strategies. Sixty first-language English subjects from an elementary school in a middle-class area of Montreal were tested. There were 10 males and 10 females from each of kindergarten, grade 2 and grade 4. Ability to delay gratification was evaluated by means of a Mischel-type delay of gratification task but with greater availability of visual distractors. In order to assess the children's knowledge of delay strategies a forced-choice, cartoon format questionnaire was developed which depicted cognitive and attentional manipulations of the delay situation which previous research had shown to either help or hinder effective delay. Results showed no significant differences with age in the ability to delay gratification. However, significant age differences were found on the knowledge of delay strategies questionnaire after item to total correlations had been performed on this measure and only those 10 items which correlated higher than .30 retained. The subsequent analysis of variance showed that

grade 2 and 4 children exhibited significantly greater awareness of delay facilitating strategies than kindergarten children ($p < .05$), but did not differ from each other. Individual item analysis provided further information about the ages at which knowledge of particular delay rules is acquired. No relationship was found to exist between the ability to delay and awareness of delay strategies or between these concepts and IQ as measured by the Peabody Picture Vocabulary Test. The only measure which showed evidence of a sex difference was the PPVT IQ, where males scored significantly higher than females. ($p = .02$).

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Self-control is a topic which has been of relevance since the beginnings of social life and as our societies become increasingly complex, the importance of each individual's ability to regulate his own behavior increases accordingly. It is neither feasible nor desirable for all the constraints on each individual's behavior to be externally imposed - any social system demands self-control skills of all of its members in order to function. The acquisition of self-control is considered to be one of the crucial aspects in the socialization of young children (Hartig & Kanfer, 1973). Self-control has, therefore, long been of interest to politicians and philosophers, educators and theologians, parents and psychologists.

Traditionally, self-control has been considered to be synonymous with terms such as "will-power" and tended to be regarded as some kind of unitary construct with strong moral and religious associations - something that one either possessed or lacked and its possession reflected upon the general moral worth of the individual. Puritanism and the Protestant Ethic taught the extreme "virtues" of self-control: the suppression and denial of all urges towards immediate gratifications and pleasures in the hope of receiving a supreme reward in the life to come (Mischel, 1974).

Delay of gratification is considered one of the central aspects of self-control, along with concepts such as

resistance to temptation, persistence and the ability to inhibit motor responses. In order to better understand these concepts and how to promote their development within a social structure it is important to have an understanding of how they are acquired within the process of normal maturation. Walter Mischel and his colleagues have made an important start in this direction in the study of delay of gratification in children, with particular reference to children's preferences for delayed, larger rewards versus immediate, smaller rewards, their ability to wait for such delayed rewards and their knowledge of the strategies which facilitate and inhibit such delay. The present research project proposes to take a developmental perspective to further promote our understanding of children's acquisition of the ability to delay gratification, and their awareness of strategies which help and hinder delay. It will also explore the relationship between children's cognitive awareness and their behavior in a delay of gratification situation.

BACKGROUND

The following review of the literature will commence by describing a variety of theoretical approaches to the concept of self-control and some of the research that relates to these approaches. It will then look at the literature that relates more specifically to delay of gratification - first from the point of view of the research on preference for immediate versus delayed rewards, and secondly the studies that have explored the cognitive and situational factors which affect the ability to delay gratification. The last section will focus on recent investigations of children's cognitive awareness of self-control strategies with particular reference to delay of gratification.

Self-Control

Psychoanalytic theories of self-control refer to motivational dynamics and the superego, as well as emphasizing the role of conscience and guilt to overcome conflict between id impulses and ego demands. They have stressed the importance of voluntary delay of gratification in such concepts as "ego strength" and "internalization" (Mischel, 1974; Kanfer, 1977; Karoly, 1977). Freud (1911) suggested that when a young infant is forced to delay the gratification of his needs he constructs a "hallucinatory wish-fulfilling image" of the desired object. With greater ego development and frequent association of tension reduction

with goal objects, externally imposed delays of gratification can be bridged by hallucinatory satisfactions (Mischel, 1974).

Skinner (1953) considered self-controlling behavior to be under the control of the individual's history, genetic prewiring and the immediate antecedent and consequent environmental stimulus events (Karloly, 1977).

More recently social learning and cognitive behavior modification theorists have taken an increased interest in studying self-control from a scientific perspective. Self-control techniques are increasingly being used in a wide variety of therapeutic interventions with adults, and to a lesser extent with children, and this growing clinical relevance has spurred a need to investigate the variables which influence the ability to self-control.

As self-control processes cannot be directly observed, their presence has to be inferred from overt behaviors. Kanfer (1977) and others (Kanfer & Karoly, 1972; Thoresen & Mahoney, 1974; Thoresen & Coates, 1976; Karoly, 1977) suggest that self-control processes can be assumed to be in effect when, in a situation involving a temporal conflict, a behavior with a previous high probability of occurrence is replaced with a behavior which previously had a low probability of occurrence, in the absence of immediate and explicit external pressures to perform the low probability behavior. The motivation to perform the new response may be ultimately under some degree of external control, for example

anticipated social approval.

Self-control is considered to be a special case of self-regulation wherein the person is exposed to a conflict involving two or more available behaviors having conflicting outcomes. Through the mediation of self-generated behaviors, action is taken which changes the likelihood of executing what was a highly stable and gratifying response pattern under the influence of external (alpha) variables, for an alternative response pattern of lower probability influenced by self-generated cues and reinforcers (beta variables), in order to meet some criterion of performance. These conflicts usually involve a choice between tolerating an immediate aversive situation or delaying immediate gratifications in order to attain some greater goal or benefit at a later time (Thoresen & Coates, 1976; Karoly, 1977; Kanfer, 1977).

Kanfer (1977) separates two types of self-control experiences: (1) decisional self-control, whereby the individual makes the choice between the available conflicting responses but once the choice has been made the situation is no longer under the control of the individual so that the conflict is terminated, and (2) protracted self-control which requires that subsequent to the choice of action, the individual must consistently maintain the new behaviors necessary until the goal is reached. Kanfer also suggests that self-control involves a three stage process of self-monitoring, self-evaluation and self-reinforcement.

Most modern self-control theorists do not treat self-

control as a unitary construct. Karoly (1977), for example, describes it as a multidimensional process involving situational, perceptual, cognitive, behavioral, attitudinal and emotional components. He suggests that efforts at self-control can be described by a four stage model: (1) Problem recognition and appraisal <----> (2) Commitment <----> (3) Extended self-management ----> and (4) Habit reorganization. The individual must first realize that the situation involves temporal conflict and be aware that there are available alternative behaviors which he can take the responsibility for executing. Karoly describes it in terms of the individual shifting from automatic response chains to "manual control". The Commitment stage reflects that the individual must make a decision that he prefers self-management techniques to any other perceived alternative method of dealing with the situation. These initial stages are closely related and mutually affect each other, as represented by the bidirectional arrows. Once the decision has been made, the process of maintaining the desired behavior requires a variety of specific skills in self-observation, contracting, stimulus control and self-reinforcement. Many self-control programmes attempt to teach the component skills of this extended self-management process. The open system model allows for events and changing perceptions at this stage to have an effect on the individual's commitment to self-management and vascillations and reversals may occur. Finally, if the preceding stages have been successful, over

time habit reorganization may take place, which terminates the necessity for inferring self-controlling processes because the new behavior now becomes the one with the highest probability of occurrence.

A wide body of research is emerging which bears on the topic of self-control from a great variety of different theoretical perspectives and research orientations. Some theorists have regarded self-control as a generalized trait and have looked for personality correlates as well as for indications of consistencies in self-controlling responses across diverse situations. Other researchers have concentrated on the situational variables which affect self-control, others have looked at the role of self-verbalizations and still others at the role of cognitions and attentional factors. Some significant correlations have been found between the various manifestations of self-control. For example Toner, Holstein & Hetherington (1977) found positive correlations between a measure of resistance to temptation and a measure of motor inhibition for both boys and girls, and for boys only between two different measures of resistance to temptation. These relationships, however, have generally been few and not large enough to have useful predictive value.

Some researchers have attempted to develop assessment techniques which reflect a relatively global approach to self-control. One such measure is the Self-Control Rating Scale developed by Kendall and Wilcox (1979) designed as a

means of evaluating children's transsituational self-control behaviors within a classroom setting so that the generalized effects of self-control training programmes can viably be assessed without the need for excessive direct observational data. The theoretical perspective of these researchers stressed both the cognitive and the behavioral aspects of self-control, which was reflected in scale items representing the nonimpulsive, deliberative, cognitive components as well as those indicative of the ability to execute behaviors decided upon, or inhibit those decided against. Teacher ratings on the Self-Control Rating Scale (SCRS) were found to correlate significantly with measures of cognitive reflectivity (Matching Familiar Figures Test), neatness and precision in drawing (Porteus Maze - Q score) and with observations of the children's self-control behavior during testing, but not with IQ (Peabody Picture Vocabulary Test) in a sample of third to sixth grade subjects. These findings suggested that this instrument was reliably measuring teacher's perceptions of both cognitive and behavioral aspects of self-control, independent of intelligence. A subsequent study (Kendall & Wilcox, 1979) found that children referred for behavior problems were rated by their teachers as exhibiting significantly less self-control according to the SCRS than non-referred children. These findings were substantiated by a study by Fischel, Robin and Brown (1981) which indicated that children referred to a Psychology/Psychiatry clinic, including a group of

hyperactive children, and children with a history of seeking psychological help scored significantly higher (indicating low self-control) than children with no history of seeking psychological help. Sex differences were found in both of these studies, suggesting that girls exhibit more self-control than boys.

Correlations have also been found between measures of self-control and various personal attributes. Toner, Holstein and Hetherington found that a measure of resistance to temptation correlated significantly with a measure of conceptual tempo, and for boys with age also. Mischel (1974) and his colleagues have found significant positive correlations between preference for delayed rewards and age, achievement orientation, social responsibility, personal adjustment, intelligence and various socio-cultural and rearing conditions. The ability to delay gratification has been significantly positively correlated with internal locus of control using a variety of different measures of delay of gratification and populations (Gilmor, 1978).

In recent years some innovative experimental paradigms have been devised to produce in the laboratory situations designed to evoke various aspects of self-management behavior, such as motor inhibition, persistence and resistance to temptation. Mischel and his colleagues at Stanford University have been some of the leading investigators in the area of resistance to temptation, especially delay of gratification, and much of their work has

been done with children. The major focus of Mischel's work on delay of gratification has been to investigate the factors, particularly situational, which affect both the preference for immediate versus delayed rewards and the ability to delay gratification. More recently Mischel has been studying children's knowledge of psychological principles and in particular their awareness of the strategies which facilitate and inhibit their attempts at self-control during delay.

Preference for Immediate versus Delayed Rewards

During the 1950s Mischel developed a technique for assessing children's preference for delayed rewards by giving them a series of choices between a smaller reward, such as a \$.05 candy bar, immediately or a larger reward, such as a \$.10 candy bar, at some later time. The series of choice pairs finally chosen for the measure were those wherein pretesting indicated that the larger reward was always preferred in a straight choice situation, but that about 50% of the children chose the smaller reward when it was available immediately and 50% chose the larger, delayed reward. Testing was made as realistic as possible by having all the choice objects present and by promising the child that he would actually receive one of his preferred choices, but not specifying which one until the end of the testing session (Mischel, 1958; Mischel & Gilligan, 1964). The task was made more appealing for young children by having the pair of choice objects displayed in the windows of a "clown box"

and the child indicated his choice by depositing a token in the slot under the preferred object which released the window at the appropriate time to dispense the reward (Mischel, 1974).

From a series of studies Mischel (1966, 1974) reports findings of small, though statistically significant, positive correlations between preference for delayed rewards and age, intelligence, such socio-cultural and rearing conditions as presence of the father in the home, and measures of social responsibility and achievement motivation. He also found that actual behavioral choices for delay were related to other behavioral measures of self-control such as resistance to temptation, but that responses to hypothetical choices were related to responses on other questionnaires about similar issues but not to actual choice behavior (Mischel, 1962).

In addition Mischel found that preference for delayed rewards was significantly influenced by various situational factors, such as expectancies of actually obtaining the delayed reward (Mischel & Metzner, 1962), affective states (Mischel, Coates & Raskoff, 1968; Moore, Underwood & Rosenhan, 1973), modeling cues (Bandura & Mischel, 1965) and characteristics of the experimenter (Mischel & Grusec, 1966; Grusec & Mischel, 1966; Mischel & Liebert, 1966, 1967), and that these overcame many individual differences. These results suggested to Mischel that it was not a very productive approach to regard self-control in terms of a

unitary personality trait or intrapsychic moral agency, as the correlations between the various aspects of self-control and with personality variables, such as cognitive style and locus of control, do not account for very much of the variance and are similar to the small positive correlations found in much personality research.

Mischel suggests a cognitive, social-learning approach to self-control which takes into account the developmental, cognitive and learning variables which contribute to the original acquisition of self-control skills in novel situations, as well as the motivational variables which influence the individual's choice in a specific situation from among the available behaviors already in his repertoire. He emphasizes the interaction between person and situation variables. For example, the willingness to delay gratification has been shown to depend in part on the expectation of actually obtaining the promised rewards. This expectancy is related to feelings of trust which are based in part on the child's own past history of promise-keeping and reinforcement for delay behavior and also situational factors such as the personal characteristics and behavior of the experimenter.

Ability to Delay Gratification

Another direction which Mischel's research has taken is the investigation of the cognitive processes operative during the maintenance of delay and in this area his main interest has been to find out the ways in which ideation during delay

affects the child's ability to wait for a preferred reward. The basic research paradigm (Mischel & Ebbesen, 1970; Mischel, Ebbesen & Zeiss, 1972) has been extensively used in its original form and with minor modifications and will be described in detail here. The child is taken to the experimental room where there is a table with a bell on it and a chair standing in a 30" square marked on the floor in tape. The room also contains a box of attractive toys and a screen. After an initial play period with the toys to build rapport, they are placed out of sight behind the screen with the promise that the child will be able to play with them again at the end of the session. The child is then taught the "Bell Game". The experimenter explains that sometimes he has to leave the room but that the child can call him back at any time by ringing the bell. This is demonstrated several times by the experimenter leaving the room and returning as soon as the child rings the bell. The child is then presented with a choice between two items and it is explained to him that the less preferred object is available immediately or at any time during the delay by summoning the experimenter to return, whereas the preferred reward is available by waiting alone, sitting on the chair until the experimenter returns "by himself". The child is then questioned to evaluate his understanding of the contingencies of the delay situation. The experimenter leaves the room and returns after a previously established criterion time (usually between 10 and 20 minutes) or when

summoned by the subject ringing the bell. The subject is not informed of the criterion time. The child's understanding is again evaluated by questioning as to which reward he should receive and he receives his appropriate reward. The dependent variable is the length of time that the child is able to wait for the preferred reward up to the criterion time. The experimenter then allows the child to play with the box of toys for a few minutes before terminating the session.

The original study by Mischel and Ebbesen (1970) manipulated attention to the rewards by having either the immediate reward, the delayed reward, both or neither rewards present during the delay period. The choices were between pretzels and cookies and the criterion time was 15 minutes. It was found that preschool children were able to wait the longest when no rewards were present for attention and shortest delay times were observed when both rewards were present, although not significantly shorter than having either the immediate or the delayed rewards alone present during delay. These findings have been consistently confirmed in later studies with a variety of food and nonfood rewards (Patterson & Carter, 1979; Yates & Revelle, 1977).

By observing the children through one-way mirrors and by means of a "Mr. Talk Box", a tape-recorder and microphone device that invited the children to tell it all that they were thinking and feeling during the delay, the researchers attempted to discover what the children were doing and

thinking about during the delay period that accounted for the differences. They found that children were able to wait longest by converting the aversive and conflictful waiting period into a more pleasant, non-aversive situation by diverting their attention from the frustration arousing rewards and distracting themselves with other activities such as singing, playing finger games or going to sleep. The theorized that the presence of the rewards and attention to them increased the child's level of frustration and made it harder to tolerate the delay of gratification. The suggestion that frustration is a significant factor in delay maintenance was supported by a study by Miller and Karniol (1976) which used time estimation as a measure of delay frustration. Time estimates of third grade students were significantly longer following self-imposed delay situations when the delay contingent rewards were present than when absent. When the delay was externally imposed, however, presence of the rewards led to shorter time estimates, suggesting that different factors may be operating for self- and externally-imposed delay situations.

Mischel, Ebbesen and Zeiss (1972) conducted a series of experiments with preschool children, the first of which investigated the role of internal and external distractors on ability to delay gratification. In this study the rewards were present during delay in order to make it harder for the children to wait. Some of the children in the first study were given a "Slinky" toy to play with during the delay

period, whilst others were instructed to think about "fun" things. Suggestions were elicited from the children as to what would be fun to think about and they were also given ideas by the experimenter, such as finding a frog or being pushed on a swing by their mothers. One control group was given no distractors and two other control groups were provided with the distractors but not in the context of the delay contingency. It was found that, as in the previous study by Mischel and Ebbesen, preschool children were hardly able to wait at all in the presence of the rewards when not provided with a distraction. However, when children had either a toy to play with, or a cognitive distractor, delay times were significantly longer, although the effectiveness of the two types of distractors was not significantly different. The distractors alone, without the delay contingency, were not enough to maintain waiting and children summoned the return of the experimenter within one or two minutes. This would suggest that the children's behavior was guided by their goals even when they seemed to be distracting themselves with other activities.

In the second experiment children were either instructed to think about sad things, such as falling down and getting a bloody knee which hurts a lot, or think about fun things as in the previous experiment, or they were told to think about the rewards. Once again it was found that children instructed to "think fun" were able to wait for long periods, an average of over 13 minutes, whereas children

instructed to "think sad", like the children who were told to think about the rewards, were not able to delay for very long at all, an average of less than 5 minutes. This would suggest that the critical component which facilitates delay is not just having an activity which distracts attention from the rewards, but that this activity must provide relief from the aversiveness of the frustrating delay situation.

In the third experiment in this series some of the children were told to think about fun things, some were told to think about the rewards and some were given no ideation instructions. Presence or absence of the rewards was also manipulated so that half of the children in each ideation condition had the rewards present and half did not. Consistent with the earlier findings by Mischel and Ebbesen (1970), in this study children not given any ideation instructions were able to wait a long time when the rewards were not available for attention but not when the rewards were present. It was also found that children told to think about the rewards were not able to wait very long in either condition, but especially when the rewards were present for attention. However, children told to think about fun things were able to delay for long periods both when the rewards were absent and when they were present. Conclusions from these studies indicate that attentional and cognitive mechanisms which increase the salience of the rewards decrease delay times, whereas cognitions which distract attention from the rewards and reduce the frustration.

facilitate delay.

The finding that the presence of the rewards has an inhibitory effect on the ability to delay was confirmed by Yates and Revelle (1977). By a method of paired comparisons preschool children ranked a series of items from both food and nonfood categories, such as a finger puppet, whistle, small box of raisins and some marshmallows, in order of preference. They were then subjected to the delay of gratification paradigm with their choice being between a food and nonfood item, their liking for the preferred item being discrepant enough from the nonpreferred to maintain a conflict situation. No differences were found due to whether the reward was a food or nonfood item. Unlike Mischel and his colleagues, however, Yates and Revelle suggest that negative affect produced by the frustration of delay is not the crucial variable in terminating the delay. They propose an "augmented decision model" which states that during voluntary delay in which the subject does not know beforehand the length of the delay, he continually reappraises his decision to wait for the preferred reward on the basis of the value of the rewards and the length of time already waited. The time already waited is traded off against the difference in value between the two rewards. Distraction, whether cognitive or external, serves to provide the subject with an activity other than decision-making and thus, whilst engaged in this alternative activity, the subject can ignore the conflict situation and avoid making a decision either to

continue or terminate the waiting period. Distraction thereby decreases the likelihood that the subject will make a decision to end the delay.

A study by Corfield, Al-Issa and Johnson (1976) found that 8 to 11 year old subjects who were reminded of the rewards by reward relevant words in a word puzzle on which they were working during the delay were inhibited by these reminders when rewards were contingent on puzzle completion. Yates and Revelle make the inference from this that the reward relevant words served as cues to remind subjects of the decision to be made. Subjects for whom the words in the puzzle were irrelevant to the rewards waited significantly longer.

Observations of the children made in the Yates and Revelle study through a one-way mirror, showed that subjects who waited to criterion were more likely to talk to themselves about things not related to the delay situation, yawn, rest their heads on their arms, look around the floor of the room and fidget in their chairs than subjects who summoned the experimenter to return. The latter were more likely to silently practice the recall signal and to stare at the rewards.

Further research by Mischel (Mischel & Moore, 1973) investigated whether attention to symbolic representations of the rewards, in the form of slide-presented images, would have the same effect on delay behavior as presence of the actual rewards. The presence of the slide was an attempt to

manipulate whether or not the child had a cognitive image of the object during the delay period. Some of the preschool subjects were exposed to slides of the reward objects, some to slides of similar but irrelevant objects, some to blank slides and some to no slides at all. Slide presentation was either continuous or periodic and the reward choices were between two marshmallows and a pretzel or two pennies and a token, the non-choice pair being the irrelevant objects. Some of the subjects were required to simply wait passively whilst others were instructed to work at a "tap-board" task which consisted of tapping a telegraph key for as long as they wanted to wait for the preferred reward. Criterion time was 10 minutes. No significant differences were found to result from either the sex of the subject or the type of reward. Unexpectedly however, it was found that, unlike presence of the actual reward objects, the presence of images of the relevant rewards presented by means of colour slides produced the longest delay times. Delay times were significantly longer in the waiting condition with relevant reward images present, as compared to slides of irrelevant objects, and the same trend was apparent, though not significant, in the working condition. There was also an imagery by task interaction due mainly to longer delay times shown by subjects in the waiting as compared to the working condition when no slide was present. These results indicate that exposure to symbolically presented rewards during delay of gratification enhances, rather than decreases the length of

delay more than does exposure to comparable distractions.

In another study by Mischel and Underwood (1974) it was found that instructions to think about the rewards facilitated delay under conditions where the preschool subjects were told that ideating about the reward relevant objects would make the experimenter return sooner, both when the actual rewards were present and when they were presented symbolically in the form of slides. Thus, when reward ideation was structured as an instrumental activity which would shorten the delay period it produced longer delay times, whereas when the situation was structured as a non-instrumental, waiting activity, ideation about the rewards hindered delay. These results were consistent for both food (marshmallows and a pretzel) and nonfood (pennies and a token) rewards. Unlike previous studies a sex difference was found, with girls waiting significantly longer than boys but only when their scores were summed over all conditions. Similar sex differences were also found in a study by Atkinson (1978).

In a further study by Moore and Mischel (1976), continuing their investigations into the role of different cognitive representations of the rewards on delay times, some of the preschool age subjects were taught to cognitively transform the reward stimuli from real to symbolic and from symbolic to real. Some subjects who had the real reward objects in front of them during delay were instructed to think about them as a picture of the objects by imagining a

frame around them and pretending they were not real, and some subjects who had a slide-projected representation of the rewards present during delay were instructed to pretend that the objects in the picture were the real objects in front of them. This manipulation of cognitive representation resulted in a dramatic extension of the previous findings such that, no matter whether the real rewards or symbolic representations of them were actually present, those children who had a cognitive representation of the rewards as pictures were able to wait significantly longer than those who cognitively represented the rewards as real, but only when the objects were the rewards relevant to the contingency.

These results show that the effects of attention depend on how the child attends to the rewards not just whether or not he does. Mischel suggests that the difference between the real and symbolic representations of the rewards may lie in the motivating and cue functions of the stimulus. Real rewards may have arousing, consummatory properties which increase frustration by augmenting the desire for the object which the child cannot have. This makes delay harder. Symbolic representations, however, may serve to remind the child of the delay contingency in a more abstract form without the arousal effect, thereby facilitating delay. Young children's thoughts about the rewards are probably very concrete, focusing on the consummatory properties such as eating the food rewards or playing with the toys. Ideation about the rewards therefore has the same effect as the real

rewards and inhibits delay, although these results may be age specific and not apply to older subjects capable of more abstract thought.

Mischel and Baker (1975) decided to compare the effect on the ability to delay gratification of instructions to ideate about the consummatory or motivational properties of rewards with instructions to ideate about their nonconsummatory properties and associations. In this study the choices were either between one or two marshmallows, or between one or two pretzels, the rewards were present for attention during the delay period and criterion time was 20 minutes. The preschool children were told that during the delay they could play the "Think About" game. Half of the subjects were then given consummatory ideation instructions emphasizing the taste and texture of the stimulus objects, such as how sweet and soft and sticky the marshmallows are and how chewy and fun they are to eat. The other half of the subjects were given nonconsummatory ideation instructions which emphasized their associations with other objects and activities, for example that marshmallows are round and white and puffy like clouds or the moon, and that they could think about these things whenever they looked at the marshmallows. For half of the subjects in each group the ideation instructions were about the reward-relevant objects and for the other half they were about the objects irrelevant to their delay contingency. A control group was given no ideation instructions. The results revealed a highly

significant interaction between ideation instructions and the relevance of the rewards. When the rewards were relevant to the delay contingency, consummatory ideation about them inhibited delay, whereas nonconsummatory ideation substantially facilitated delay as compared to both the consummatory ideation and control groups. However, consummatory ideation about irrelevant objects substantially lengthened delay times as compared to the nonconsummatory and control group subjects. Nonconsummatory ideation about irrelevant objects inhibited delay. Thus consummatory ideation about relevant rewards inhibited delay, whereas consummatory ideation about irrelevant objects facilitated delay. The mean delay time of the control group was slightly, although not significantly, higher than that of the consummatory-relevant group suggesting that the children given no ideation instructions behaved in essentially the same way as the children given consummatory instructions by focusing on the arousing properties of the rewards.

Again these results suggest that the important factor is not whether or not the children attend to the rewards during delay, but how they focus their attention, whether in "hot", arousing, consummatory ways or "cool", nonconsummatory, more abstract ways that cognitively transform the stimulus objects. They also indicate that consummatory ideation might be more pleasurable than nonconsummatory and thus lead to longer delay times when the object of ideation is not that for which the subject is

waiting. When the object of consummatory ideation is the relevant reward it increases the frustrativeness of the delay and therefore inhibits delay capability.

A follow-up study by Moore and Mischel (cited in Mischel & Baker, 1975) adds further support for the critical role of the cognitive transformations by showing that the delay facilitating effects of viewing reward-relevant slides can be reversed by instructing these subjects to think about the rewards in consummatory, "hot" ways during the delay.

A study by Higgins (1976) however, also with preschool subjects, failed to show a differential effect on delay time from "hot" versus "cool" ideation. This study found that delay was equally facilitated for groups of subjects who were instructed to make overt verbalizations of self-instructions which focused on both the consummatory and the nonconsummatory qualities of the rewards as well as on the delay contingency, when compared to groups of subjects given task irrelevant verbalization instructions.

Randolph-Johnson (1977) also found that tape-recorded self-instructional messages which emphasized the positive outcomes of effective delay, played during the delay period, greatly increased the length of delay over task irrelevant verbalizations and no verbalizations for preschool age children.

Most of the experiments described so far have involved passively waiting for rewards whereas many real-life situations require some active work in order to gain

preferred rewards and there have been suggestions that different factors may be operating in a delay situation where the reward is contingent upon some instrumental activity. Several investigators have looked at this aspect of delay of gratification and some of the findings have been conflicting, suggesting that the type of task and the child's perception of it as instrumental in shortening the delay period may be important factors.

Mischel and Moore (1973) found no significant differences in ability to delay gratification between preschool subjects who were waiting and those who were working at a simple, repetitive task, pressing a telegraph key, in the presence of reward relevant, reward irrelevant or blank slides. The task was not presented as being instrumental to obtaining the reward. However, when there was no slide at all present, subjects who were working delayed for significantly shorter periods than those who were waiting.

In the study by Mischel and Underwood (1974) it was found that preschool subjects who were instructed to think about the relevant rewards as an instrumental activity to bring the experimenter back faster were able to delay longer than subjects instructed to think about the relevant rewards but for whom this activity was not structured as instrumental in the delay situation.

Corfield, Al-Issa and Johnson (1976) gave children between the ages of 8 and 11 years a word puzzle to work on

during delay. For some the preferred reward was contingent upon completion of the puzzle, while for others it was not. Also for some of the subjects the words in the puzzle were relevant to the rewards for which they were waiting, while for others the words were irrelevant. Their study showed that subjects for whom the rewards were contingent on puzzle completion, regardless of word content, were not able to delay as long as subjects for whom the rewards were not contingent and the words were irrelevant. Reward relevant words in the noncontingent condition also made it harder to wait. In this experiment criterion time was 60 minutes and the rewards were both food and nonfood items. The experimenters suggested that the obligation to perform the puzzle reduced its enjoyment and made it harder to wait. All subjects who had the puzzle to do during the delay period, however, delayed significantly longer than a control group who were given nothing to do.

Patterson and Carter (1979) found that presence of the rewards had a differential effect depending on whether the subject was waiting or working during the delay. In this study some of the preschool children were required to "feed" marbles to "Baby Bird" - a jar decorated to look like a hungry young bird - in order to obtain their preferred reward, which in this case was a two star Good Player Award. The less preferred reward had only one star. Other children were just required to "wait with Baby Bird". Consistent with earlier findings (Mischel & Ebbesen, 1970) presence of the

rewards inhibited delay in the passive waiting situation. However, children in the working condition worked significantly longer and completed more work when the rewards were present than when they were absent. These results led the authors to hypothesize that the cognitive dynamics of effective self-control in working situations may differ substantially from those in waiting situations. They suggest that the consummatory properties of the rewards served to increase frustration which energized the subjects to greater effort in the working situation, whereas in the waiting condition it had no such outlet and made waiting harder. Indeed, in an additional study, the same researchers found that second grade children involved in an active working task made longer estimates of the time the experimenter was out of the room when the rewards were present than when absent, suggesting greater frustration.

Vellekoop (1981) used an apparatus similar to that used by Patterson and Carter (1979). In this study preschool children had to feed marbles into "Happy Dog", an apparatus which consisted of a toy dog's head which could be placed on different bottles to provide the children with either feedback or no feedback on the amount of work they had completed. Some of the bottles were also marked with a yellow goal line which indicated the amount of work required to bring the experimenter back sooner so that they could obtain the preferred reward. Rewards were one or two marshmallows and the criterion time was 20 minutes.

Vellekoop's results showed that children delayed longer and worked more in the goal-contingency condition than when there was no goal contingency. They also waited longer and completed more work when they received feedback about the amount of work completed. The longest delays were found in a combination of these conditions, when the children had a goal contingency and could see how they were performing relative to their goal. Older preschoolers delayed longer than younger ones. The findings that an activity perceived as instrumental in shortening the delay served to increase the length of time children were willing to wait is consistent with Mischel and Underwood's (1974) finding that "instrumental" thoughts lengthened delay time.

General conclusions that can be drawn so far from the delay of gratification situations which involve some active work are that presence of the actual rewards does not seem to be as inhibitory to successful delay as it is in the passive waiting situations, and that activities construed as instrumental in speeding the return of the experimenter and shortening the delay appear to have a facilitory effect on the ability to delay. The complexity and appeal of the task may also be a relevant factor in determining whether it helps or hinders delay, with interesting, enjoyable tasks being more facilitory than boring, repetitive ones.

Knowledge of Delay Facilitating and Inhibiting Strategies

All of the above-mentioned work on delay of gratification has provided some interesting information on

some of the factors which affect young children's ability to delay. Various rules or principles have emerged which have consistently been shown to have a facilitory or inhibitory effect on delay. For example, presence of the actual rewards during waiting inhibits delay unless they are cognitively transformed into symbolic representations or attention is focused on their nonconsummatory aspects. Mischel and others have become interested in investigating how much children are aware of these rules and principles and whether their knowledge is used in their own attempts at self-control to devise helpful strategies. The findings from the delay of gratification experiments identifying the conditions that facilitate or inhibit delay provide objective criteria against which children's understanding of effective strategies for self-regulation can be judged.

Mischel, Ebbesen and Zeiss (1972) attempted to discover if preschoolers were aware, prior to the delay, that covering the rewards would make it easier for them to wait for their preferred choice. They found that subjects chose randomly between placing an opaque cake cover over the relevant rewards, irrelevant similar objects and another fixed spot on the table, indicating that they had no prior insight into the role of attention during delay. Observations of the children during the delay did suggest that they were engaging in a wide variety of self-distractive strategies that served to facilitate delay, but it was not clear that they were cognitively aware of the delay

facilitating effect of their activities.

In a study of children's knowledge of some of the basic principles and rules of psychology, Mischel and Mischel (1979) found that by the fourth grade subjects had a substantial intuitive knowledge, when tested in a multiple choice questionnaire format, regarding the outcomes of some basic psychological experiments. Particularly relevant here is that subjects from both fourth and sixth grades knew ($p < .001$) that not attending to either the immediate or delayed rewards facilitates delay, as found in the Mischel, Ebbesen and Zeiss experiment. For fourth grade subjects scores on the knowledge of psychological principles test were not significantly correlated with either reading achievement test scores or IQ scores. However for sixth grade students these correlations were significant.

Further research (Mischel, Mischel & Hood, 1978; Mischel & Mischel, 1979) looked specifically at children's knowledge of effective ideation during delay of gratification by means of structured interviews and forced-choice questions. After the basic delay paradigm had been described to them, preschool, Grade 3, and Grade 6 subjects were asked if delay would be facilitated by having the rewards exposed or covered. They were then told to imagine that the rewards were exposed and questioned as to what they could think about that would help them to delay. Following this, the children were presented with pairs of alternatives between consummatory, "hot" and abstract, "cool" ideation about the

rewards, and between "hot" and task contingency ideation and asked which in each pair would most facilitate delay and why.

The findings revealed a developmental progression in children's awareness of effective delay rules from the preschooler's preference for and belief in the very strategies that make delay most difficult, to the sixth grader's sophisticated understanding of the delay facilitating principles. Children under age 5 preferred to view the real rewards during delay, but by age 6 many children realized the advantages of covering the rewards and that looking at and thinking about them would hinder delay. By age 8 the children preferred to focus on the task contingency rather than "hot" ideation but it was not until the sixth grade that most subjects recognized the advantages of "cool" ideation in facilitating delay. Thus it was found that there was a significant positive correlation between knowledge of delay facilitating strategies and age ($r=.45$, $p<.001$) across the total age range, although not within each age range.

The few preschoolers who spontaneously generated self-control strategies either referred to the delay contingency and task requirement or suggested self-distraction. The most frequent strategies generated by the elementary school subjects were, in descending order of frequency, focusing on the task contingency, distraction, negative or non-tempting ideations about the rewards to reduce their appeal and a few suggested positive and hot ideations about the rewards.

Grade 3 and 6 children did not differ significantly in their distribution among the categories. Both in response to specific questions and in the generation of spontaneous strategies, these results indicate a linear progression with age in children's awareness of delay enhancing strategies evaluated against objective criteria.

Yates and Mischel (1979) took a different approach to understanding children's attentional strategies in a delay of gratification situation by allowing the children to control their self-exposure to either the real rewards, symbolic representations of them or real or symbolically presented irrelevant objects. For this series of experiments they designed an electromechanical device which consisted of two boxes, one containing a stimulus previously shown to be delay facilitating and the other containing a delay hindering stimulus. These could be opened one at a time, but not both together, to display the contents by pressing on the appropriate button. The frequency and duration of button pressing for each stimulus was automatically recorded. The rewards were small food and nonfood rewards (pretzels, marshmallows, cookies, poker chips, pennies and marbles) and the children ranged in age from 2 1/2 to 9 years. Yates and Mischel found that children up to age 7 preferred to view real objects rather than pictures independent of whether they were relevant rewards or irrelevant to the delay contingency. These results were consistent for both self-imposed and externally-imposed delay situations. It was also found that,

when instructed prior to the delay to view those stimuli that they most wanted to see, children showed a significant preference for viewing the real rewards but this preference was not evident when instructed to view those stimuli that would most help them to wait, suggesting that they did not know which would help more and chose randomly. These results indicate that preschoolers up to age 7 are not aware of the attentional strategies that promote delay and in fact choose to view the real stimuli which are the most counterproductive to effective delay.

Elementary school children, however, in both self-imposed and externally imposed delay situations involving food rewards, showed a clear awareness that viewing the alternate non-food stimuli would facilitate delay, although when waiting for non-food rewards they preferred to view the actual relevant rewards. In the latter situation the alternative to viewing the real rewards (marbles) was to view cookies which were irrelevant to the contingency but might nonetheless have been arousing and frustrating as the children had no hope of getting them. Therefore, viewing the marbles might have been the less frustrating choice in this particular combination. These findings, like the work of Mischel, Mischel and Hood, suggest a developmental progression in children's awareness of effective delay strategies.

A clinical interview method for studying children's knowledge of self-control has been used by Schultz (1981).

She presented short vignettes dealing with situations requiring various aspects of self-regulation, specifically delay of gratification, persistence, resistance to temptation and social frustration tolerance, to kindergarten, third and sixth grade subjects. The children's responses to standardized, open-ended questions were coded in categories representing strategies for initiating and maintaining self-control. Results showed a significant decrease with age in appeal to an authority figure for help in dealing with the situations and increase with age in mentioning the positive consequences for oneself from the more desirable behaviors, negative consequences from the less desirable behaviors, eliminating the temptations and self-distraction. The sixth grade subjects referred significantly more often to rules and other people's expectations, devaluing the temptation and role-taking which emphasized the impact of their behavior on another person. For the delay of gratification vignettes, the category mentioned most frequently by all age groups was positive consequences and the third and sixth graders referred to the negative consequences more than kindergarten children. Sixth grade subjects referred to self-distraction significantly more than kindergarten children.

Schultz concluded that with age children's verbalizable knowledge of self-control becomes increasingly complex and varied and strategies for self-regulation become increasingly internalized and abstract as well as more effective in coping with frustrating situations. Her

findings also show that by kindergarten age children are able to verbalize self-control strategies including the positive consequences of delaying gratification.

STATEMENT OF THE PROBLEM

Many investigators have stressed the importance of cognitions in self-control and the necessity for knowing more about the relationship between cognition and action. Mischel and Mischel (1979) for example, questioned whether the few elementary school children in the 1978 study (Mischel, Mischel & Hood) who suggested positive and hot ideations about the rewards as delay facilitating strategies would also be those children who would have most trouble in delaying gratification in an actual situation. Although assumptions are frequently made that our cognitions play a major determining role in our actions, no-one has as yet looked at this relationship with specific reference to the effect of children's cognitions about the strategies which help and hinder delay on their performance in a delay task. One of the major purposes of the present study is to investigate whether there is a relationship between children's ability to delay gratification and their knowledge of the principles which facilitate delay. It is hypothesized that those children who display greater sophistication in their awareness of delay enhancing strategies will be better able to successfully wait for their preferred rewards.

In order to be able to evaluate children's knowledge of delay facilitating and inhibiting strategies against objective criteria it was necessary to develop an independent measure of such knowledge. A few attempts have already been made to understand children's knowledge of delay principles.

These have primarily used observational techniques, which do not allow for an evaluation of whether or not the children have a cognitive awareness that the activities they are engaging in during the delay make the waiting easier or harder. Others have used open-ended interviews which encourage the children to generate their own strategies, the effectiveness of many of which has not yet been established by objective criteria.

Mischel, Mischel and Hood (1978) have made some preliminary explorations towards developing a separate knowledge measure by asking children a series of three questions giving them a choice between the rewards being covered or exposed, hot versus task contingency ideation, and hot versus cool ideation, as effective strategies. This was after the delay paradigm had been described to them either orally (for the preschoolers) or in written form (for the grade 3 and 6 subjects). This format requires that the children understand and retain a great deal of complex information in order to make a reliable, well-informed choice and one might question whether the cognitive complexity of the task itself might not account, to a certain extent, for the age differences in responses found in this study.

Another purpose of the present study, therefore, was to develop a measure which would make the choices between delay facilitory and inhibitory responses more understandable and salient to a wide age range of subjects, whilst providing the opportunity to include a more comprehensive coverage of our

present knowledge of effective strategies without making the task too cognitively complex for young children to be able to comprehend. A cartoon format was chosen, which would appeal to children of many age groups and would clearly depict the delay facilitory and inhibitory manipulations in a form that they would be able to look at whilst making their choice rather than having to remember. In addition, it was hoped that their own previous experience in the delay situation would reduce the amount of information they had to understand and remember from purely verbal descriptions. By using different versions for the boys and the girls and by commencing with the remark that the pictures were of a girl (or boy) who had been waiting for prizes "just like you", it was intended that the children would identify with the child in the drawing and utilize their own recent experience in a similar situation in making their choices.

As previous research had shown a relationship at the upper elementary school grades between intelligence and children's knowledge of a variety of psychological principles, including some relating to delay of gratification (Mischel, 1979), and as sophistication in cognitive awareness of delay principles might intuitively be expected to be related to intelligence, it was hypothesized that a positive correlation would be found between IQ and the child's score on the Knowledge of Delay Strategies Questionnaire.

It is also frequently assumed (Mischel, 1979), and some evidence has emerged to the effect that, self-control skills

increase as a function of age (Kendall & Wilcox, 1979). Mischel & Mischel (1979) have suggested that with increasing age and cognitive development, children are better able to delay gratification by generating attentional strategies which help them avoid the frustrative arousal inherent in the delay situation. Until now, however, the great majority of research into delay of gratification has been done with preschool age children, and the few studies which have used older subjects have been comprised of manipulations which make it difficult to compare conditions across studies for developmental trends. The present study, therefore, was designed to take a developmental perspective to investigate whether, under the same set of experimental conditions, children of different ages do in fact differ in their ability to delay gratification. It was hypothesized that children's ability to delay gratification would increase with age.

The delay of gratification paradigm has intuitive appeal as a measure of what is considered one of the major aspects of self-control. However, it has not been shown to be very systematically related to other measures of self-control. One possible reason which has been suggested for this is the specificity of situations and behaviors and lack of transsituational generalizability in the concept itself, and this is supported by the multi-dimensional viewpoint. However, in order for the delay of gratification paradigm to have some validity as a measure of even a very specific aspect of self-control behavior, it is felt that it should

relate in some way to other behaviors outside of the specific paradigm. In an attempt to partially validate the paradigm a more general measure of the children's self-control behaviors in a classroom situation was collected in the form of teacher ratings on the Self-Control Rating Scale, and it was hypothesized that children's general self-control behavior within the classroom would correlate with their ability to delay gratification.

METHOD

Subjects

The final sample consisted of 20 children from each of kindergarten, grade 2 and grade 4, except that one girl for the grade 2 group was selected from among the oldest girls in grade 1, as there were not enough girls available at the grade 2 level to equate group numbers. There were equal numbers of boys and girls at each level. Table 1 gives the mean ages and age range at each grade level by sex. These subjects were from an elementary school in a middle-class, predominantly anglophone area of Montreal. Where possible subjects were randomly chosen from class lists and consent forms and a letter describing the study were sent home for the parents to sign (see Appendix A). In some classes it was necessary to use all available subjects willing to participate in the study in order to have ten subjects in each grade by sex group. All 65 children who returned affirmative consent forms were tested. However, five subjects were eventually dropped - two grade 4 boys because it was not possible to establish a valid IQ for them as their performance exceeded the values given in the normative tables, two grade 4 girls whose IQ scores fell at or below a minimum cut-off of 85, which is one standard deviation below the mean, and one grade 1 girl who returned her consent form but was not needed to make up the numbers.

TABLE 1

Mean Ages, Standard Deviations and Age Ranges
by Grade Level and Sex

	<u>Female</u>	<u>Male</u>
<u>Kindergarten</u>		
Mean Age (years-months)	6-0	6-4
Standard Deviation	(.31)	(.22)
Age Range	5-7 to 6-7	6-1 to 6-8
<u>Grade 2</u>		
Mean Age	8-0	8-0
Standard Deviation	(.40)	(.33)
Age Range	7-3 to 8-9	7-5 to 8-5
<u>Grade 4</u>		
Mean Age	10-3	10-1
Standard Deviation	(.40)	(.33)
Age Range	9-9 to 11-6	9-7 to 10-6

All children tested were first language English except two, whose mother tongue was marked as Lithuanian but who had been born in Canada and whose teachers assessed them as equally fluent in English as their peers.

Setting

Due to space limitations in the school where the testing was done, the only room available was a small storage room, the walls of which were lined with shelves displaying a wide variety of school supplies and stationary. This represents an important departure from the bare experimental room used by Mischel and his colleagues, the implications of which will be discussed later. The room was set up with two chairs, a table and a small bell. The experimenter also had a desk and chair in the corridor immediately outside the door of the room.

Measures

Ability to Delay Gratification: The reward items were rulers, fancy erasers, small notepads, stickers and attractive pencils. These items were used instead of the marshmallows and pretzels generally used by Mischel and others to make the task more appealing to the older subjects used in the present study. Non-food items were chosen to control for hunger differences due to times of testing. Overall the descending order of popularity of the items was notepads, rulers, pencils, stickers and erasers. Although

some items did prove to be more popular than others, all items were ranked in each position by some subjects and there was not a high degree of discrepancy in the popularity. A stop-watch was used to measure the length of time from the experimenter's departure from the room until the child rang the bell, up to a criterion of 20 minutes.

Knowledge of Delay Facilitating Strategies: The children were administered a Knowledge of Delay Strategies Questionnaire developed for this study, which consisted of 18 pairs of coloured, cartoon-style drawings of a child sitting at a table in the delay of gratification situation (see Appendix B). One drawing in each pair depicted a cognitive or attentional delay facilitating manipulation and the other a delay inhibiting manipulation, such as presence versus absence of the rewards. These drawings were based on the findings from the delay of gratification research conducted primarily by Mischel and his colleagues. Two separate sets of cartoon drawings were used, one set depicting girls in the delay situations, which was administered only to female subjects, and another set depicting boys, for administration to male subjects. It was thus hoped to maximize the subjects' identification with the child depicted in the drawing so that he would utilize his own experience in the delay situation in answering the questionnaire. Each experimental manipulation depicted in the pictures was explained to the child by means of a standard text read by the experimenter. Each set of drawings was mounted in a

separate three-ring binder with the two pictures side by side on the right-hand page facing the child, and the accompanying text on the left-hand page facing the experimenter. Delay facilitating and inhibiting items were equally distributed in randomized order to control for right or left preference and other response biases.

This instrument was pretested with children from preschool to age 10 to ensure children's ability to understand the items independently of having experienced the delay situation.

IQ: The Peabody Picture Vocabulary Test - Form A was used as a general measure of verbal intelligence. This consists of a booklet containing 150 pages with four line-drawings per page, and three example pages. A separate answer sheet is used for each child. It takes approximately 10 to 15 minutes to administer and requires that the child indicate in some way which of the four line-drawings best depicts the word read by the experimenter. The PPVT has been shown to have good reliability - a median correlation of .77 using an alternate form at retest after less than two weeks, and a median delayed retest reliability coefficient of .72 using the same form within one year. Construct validity studies of this measure have produced median correlation coefficients of .62 with the Stanford Binet Intelligence Scale, .64 with the Full Scale WISC IQ, and .72 with the Full Scale WAIS IQ. Slightly higher median correlations have been found with the Vocabulary subtests of these scales. These

findings suggest that the PPVT is a moderately good indicator of general intelligence. Males have generally been found to score slightly higher than females (Dunn & Dunn, 1981).

Self-Control Rating Scale: The Self-Control Rating Scale is a 33 item questionnaire developed by Kendall and Wilcox (1979). It was completed by the two grade 4 teachers for each child in their classes who participated in the study. At the request of the school principal, teachers of other grade levels were not asked to complete these forms, due to the amount of research in which their classes had already participated during the course of the year. This questionnaire allows the teacher to evaluate the child's behaviour, according to a seven point scale, on 33 separate items depicting a variety of classroom situations relating to self-control (see Appendix C). In a sample of third to sixth graders an internal consistency coefficient of .98 showed the SCRS to have a high degree of consistency among items, test-retest reliability over 3 to 4 weeks was .84, and the discriminant validity of this measure was supported by a nonsignificant correlation of .07 with Peabody Picture Vocabulary Test IQ scores. Boys were found to score significantly higher than girls, indicating they they exhibited less self-control (Kendall & Wilcox, 1979).

Procedure

Each child was brought from the classroom by the experimenter, a female graduate student, and taken to the

experimental room. A few minutes were spent establishing rapport by talking with the child and giving a general explanation of the kinds of "games" the child would be playing.

The child was then shown the five reward objects, notepad, pencil, eraser, ruler and sticker, to rank in order of preference by indicating which of the five objects he liked the "very best of all". This object was put aside and the child was asked to indicate which of the remaining objects he liked best. This procedure was continued until all the objects were ranked. The experimenter then put the objects away promising that some of them would be returned to later.

The Peabody Picture Vocabulary Test was introduced and administered according to the standard, age appropriate instructions given in the manual.

The child's attention was then drawn to the bell which was placed on the table and the "Bell Game" was explained. The experimenter stated "Sometimes I have to leave the room, but you can call me back by just ringing this bell. Let's try it. I'll leave the room and you ring the bell". The experimenter then left the room and returned as soon as the child rang the bell. For the kindergarten children the procedure was repeated. When the experimenter returned she remarked: "You see what happens? Whenever you ring the bell I come back into the room. You can call me back whenever you want by ringing the bell".

The experimenter then took out the child's second and fourth ranked reward choices, told the child he would get to keep one of them and asked which of them he preferred, to confirm the earlier ranking¹. The purpose of getting the child to rank the objects in order of preference and then presenting him with a choice between the second and fourth choices for the delay situation was an attempt to ensure that the items were of similar value to the child yet different enough to elicit the desire to wait for the preferred object. If the items were too similar in value the child would not be motivated to wait at all and if their value was too discrepant the child would not experience the conflict between the two desired objects and would much more easily wait for the preferred reward. Although no assumption was made of equal discrepancies in desirability between the reward objects across children, this procedure did attempt to minimize these discrepancies as much as was thought possible.

The experimenter then introduced the delay of gratification task by saying "You know what? I have to go out of the room now, and if you sit in your chair and wait until I come back by myself, then you can have the _____ (preferred reward). But, you know, if you don't want to

¹Seven out of the 60 subjects reversed their previous order of preference. Consistent with the procedure of Yates and Revelle (1977), the latter preference was respected for the subsequent delay task. As all subjects were able to answer the delay contingency questions correctly their data was retained.

wait, you can ring the bell and bring me back anytime you want to. But if you ring the bell and call me back you can't have the _____ (preferred reward) but you can have _____ (less preferred reward). So, if you ring the bell and bring me back then you can't keep the _____ (preferred reward) but you can keep the _____ (less preferred reward).

The child's understanding of the delay contingency was evaluated by asking the following three questions:

1. Can you tell me which prize you get to keep if you sit in your chair and wait for me to come back by myself?
2. If you want to, how can you make me come back?
3. If you ring the bell and bring me back, then which prize do you get to keep?

None of the children had any difficulty answering these questions correctly. The children were then told that when the experimenter returned, whether by herself or because they rang the bell, they would play a picture cartoon game. Some of the younger children asked where the experimenter would be and were told that she would be at her desk just outside the door of the room. The experimenter then left the room and timed the length of delay until the child rang the bell up to a criterion of 20 minutes, at which time she returned to the room and asked the child which prize he should receive. All children answered correctly and were given the appropriate reward.

The Knowledge of Delay Strategies Questionnaire was introduced by the experimenter telling the child "Now I am

going to show you some pictures of some girls (boys) who have been waiting for prizes just like you have, and I want you to tell me in which picture you think the girl (boy) would be able to wait longer."

The child was then shown the series of 18 items depicting a same sex child, while the experimenter read the accompanying text explaining the drawings. Their answers were marked on a data sheet.

On completion of the questionnaire the child was thanked for his participation and asked not to tell the other children what had taken place so as not to spoil the surprise for them. He was then returned to his classroom.

Self-control Rating Scales were scored by the teachers for all the grade 4 children participating in the study. The teachers were not aware of nature of the study beyond that it had to do with delay of gratification.

RESULTS

IQ

The IQ scores were subjected to a 2 (sex) by 3 (grade level) ANOVA and found to differ significantly by sex, $F(1,54) = 5.641, p = .021$, but not by grade level, $F(2,54) = 1.539, p = .224$ (see Table 2). As shown in Table 3, the mean IQ scores of the males were consistently higher than the females at each grade level. There were no sex by grade level interactions.

A series of Pearson Product Moment Correlation Coefficients were computed to investigate the relationships between IQ and the other dependent measures (see Appendix E). Of particular interest was the correlation between IQ and knowledge of delay facilitating strategies as measured by the cartoon-format questionnaire as the work of Mischel (1978) had suggested that a relationship might exist between these two concepts especially at the higher grade levels. However, no significant correlation was found between IQ and knowledge of delay strategies over the entire sample, $r = .130, p = .161$. The only group wherein these measures were correlated was the grade 2 girls, $r = .641, p = .022$. Nor were any significant correlations found in the overall sample between IQ and the ability to delay, $r = .035, p = .394$, although this relationship was significant within the group of kindergarten girls, $r = .716, p = .010$, or between IQ and the Self-Control Rating Scale, $r = -.069, p = .387$. When multiple correlations

TABLE 2

ANOVA Table of IQ by Sex and Grade Level

Source	SS	df	MS	F	P
Main effect	1636.0	3	545.333	2.906	.043
Sex	1058.4	1	1058.400	5.641	.021
Grade	577.6	2	288.800	1.539	.224
Sex by grade	212.8	2	106.400	.567	.571
Explained	1848.8	5	369.760	1.971	.098
Residual	10132.6	54	187.641		
Total	11981.4	59	203.075		

TABLE 3

Mean IQ by Sex and Grade Level

	<u>Female</u>	<u>Male</u>
<u>Kindergarten</u>		
Mean	110.1	113.3
Standard Deviation	(13.92)	(17.34)
<u>Grade 2</u>		
Mean	114.1	124.1
Standard Deviation	(16.09)	(11.79)
<u>Grade 4</u>		
Mean	107.9	119.9
Standard Deviation	(8.14)	(12.93)

are performed the probability of achieving significant results by chance alone increases as a function of the number of correlations. It is therefore recommended that an error rate per hypothesis of .05 be maintained by means of the Bonferroni procedure of dividing the nominal alpha level by the number of correlation coefficients being computed (Larzelere & Muliak, 1977), in this instance $.05/36 = .001$. This procedure suggests that the correlations found within individual sex by grade level groups are a function of chance variations and do not reach adequate levels of significance.

In view of the lack of consistent relationships between IQ and the other dependent variables, it was deemed unnecessary to covary out IQ for the purposes of subsequent analyses despite the IQ differences between the males and females.

Ability to Delay Gratification

The present study failed to support the hypothesis suggested by the work of Mischel (1979) that the ability to delay gratification would increase with age as a function of increasing cognitive development. Table 4 shows mean delay times in minutes by sex and grade level. These means of 12.50 for kindergarten children, 15.41 for grade 2 and 17.12 for grade 4 tend to suggest an increasing ability to delay with age. However, the distribution of scores was non-normal and negatively skewed, as 60% of the total sample waited to the full criterion time (see Figure 1, Appendix D). As can

TABLE 4

Mean Delay Time in Minutes by Sex and Grade Level

	<u>Female</u>	<u>Male</u>
<u>Kindergarten</u>		
Mean	14.57	10.43
Standard Deviation	(7.59)	(9.42)
<u>Grade 2</u>		
Mean	14.00	16.82
Standard Deviation	(9.03)	(6.60)
<u>Grade 4</u>		
Mean	16.83	17.41
Standard Deviation	(5.93)	(5.99)

also be seen from Table 4, the variance was large, especially at the younger age levels. Despite the non-normal distribution, an analysis of variance was considered the analysis of choice because of its robustness, especially as Cochran's C tests did not indicate significant heterogeneity of group variances, group Ns were equal and the distributions were all skewed in the same direction (Kirk, 1968).

A 2 (sex) by 3 (grade level) ANOVA computed on the delay scores indicated that the differences between the means of the three grade levels were not statistically significant, nor were there significant differences between males and females in their ability to delay gratification as measured by the delay paradigm (see Table 5). The lack of sex differences is consistent with the majority of previous studies.

The nature of the distribution of delay scores allowed for the subjects to be easily divided into three groups according to their ability to delay gratification. Group 1 (Non-delayers) consisted of those children who waited less than 3 minutes, as it was felt that these children never really committed themselves to waiting for the preferred reward. The range within this group was from 1 to 125 seconds and the group was composed of 11 subjects. Group 2 (Tryers) consisted of those who waited more than 3 minutes but called the experimenter back before the criterion time of 20 minutes. Thirteen subjects fell into this group and the

TABLE 5

ANOVA Table of Ability to Delay Gratification
by Sex and Grade Level

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Main Effect	787034.050	3	262344.683	1.277	.292
Sex	3270.817	1	3270.817	.016	.900
Grade	783763.233	2	391881.617	1.907	.158
Sex X Grade	455297.033	2	227648.517	1.108	.338
Explained	1242331.083	5	248466.217	1.209	.317
Residual	11097623.900	54	205511.554		
Total	12339954.983	59	209151.779		

range was from 262 to 1182 seconds. It was felt that these children made an attempt to wait for their preferred reward but changed their minds at some point during the delay time and settled for the less preferred reward. Group 3 (Delayers) consisted of the 36 subjects who were able to successfully wait until the criterion time to receive their preferred reward.

A chi-square test of independence was computed to explore the possibility of a relationship between grade level and the ability to delay as defined by these three groups. As no suggestion of sex differences had been found in the previous analysis, males and females were combined within each grade level. Table 6 shows frequencies of Non-Delayers, Tryers and Delayers at each grade level. The chi-square analysis was not significant at the .05 level, indicating that the hypothesis of differences in the numbers of Non-delayers, Tryers and Delayers at the three grade levels was not confirmed, ($\chi^2 = 5.237$, $df=4$, $p = .264$).

Knowledge of Delay Strategies

Scores on the knowledge of delay strategies questionnaire ranged from 6 to 16 from within a possible range of 0 (all items answered incorrectly) to 18 (all items answered correctly). Table 7 shows mean knowledge scores by sex and grade level.

An ANOVA of knowledge of delay strategies by sex and grade level approached, but did not reach, statistical

TABLE 6

Frequencies of Non-Delayers, Tryers and Delayers
by Grade Level

	<u>Non-Delayers</u>	<u>Tryers</u>	<u>Delayers</u>
KINDERGARTEN	6	5	9
GRADE 2	4	3	13
GRADE 4	1	5	14

TABLE 7

Mean Knowledge of Delay Strategies Score
by Sex and Grade Level

	<u>Female</u>	<u>Male</u>
<u>Kindergarten</u>		
Mean	9.9	10.8
Standard Deviation	(2.38)	(1.87)
<u>Grade 2</u>		
Mean	11.3	12.4
Standard Deviation	(2.11)	(2.46)
<u>Grade 4</u>		
Mean	12.0	11.6
Standard Deviation	(2.26)	(2.17)

significance, $F(2,54) = 2.954, p = .061$, revealing a trend in the expected direction, that older children have a greater awareness of the kinds of strategies which facilitate effective delay (see Table 8). No significant sex differences nor sex by grade level interactions were found.

As this questionnaire is a new measure in the developmental stages, an item analysis was performed to evaluate which were "good" items. All subjects' scores on the individual items were correlated with their overall scores on the questionnaire and it was found that Items 3, 5, 6, 9, 11, 12, 14, 15, 16 and 17 achieved correlations greater than .30 with the total score. Columns 7 and 8 of Table 9 show the item to total knowledge score correlation coefficients and probability levels.

A further 2 (sex) by 3 (grade level) ANOVA was then computed using subjects' scores on only those ten items which had been found to correlate higher than .30 with the total knowledge score. Group means on the reduced (10 item) questionnaire are given in Table 10. Scores on this reduced questionnaire correlated .92, $p = .001$ with scores on the full 18 item questionnaire. As indicated in Table 11, this analysis of variance showed significant group differences, $F(2,54) = 3.662, p = .032$, but no sex differences, $F(1,54) = .055, p = .815$. A ~~post~~ ^{post} hoc Least Significant Differences test showed that the grade 2 and grade 4 children performed significantly better than the kindergarten children but did

TABLE 8

**ANOVA of Knowledge of Delay Strategies Scores
by Sex and Grade Level**

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Main Effect	33.300	3	11.100	2.258	.092
Grade	29.033	2	14.517	2.954	.061
Sex	4.267	1	4.267	.868	.356
Grade X Sex	6.633	2	3.317	.675	.513
Explained	39.933	5	7.987	1.625	.169
Residual	265.400	54	4.915		
Total	305.333	59	5.175		

TABLE 9

Description of Knowledge of Delay Items with Percentages
of Correct Responses Overall and by Grade Level,
Correlations with Total Score and Probability Levels

Item Description	% Correct				Corr. with Total	P
	All	K	2	4		
<u>Majority Correct - All Grades</u>						
4 Think fun vs think sad ¹	86.7	80	90	90	.275	.017
6 Think fun vs think rewards - rewards present	85	70	95	90	.435	.001*
8 Think fun vs think rewards - rewards absent	83.3	75	80	95	.264	.021
11 Cool vs hot ideation	80	70	90	80	.536	.001*
14 Think picture vs real - real present	80	70	80	90	.443	.001*
2 No instruction vs think rewards	71.7	75	70	70	.257	.024
<u>Majority Correct - Grades 2 and 4</u>						
5 Slinky toy vs no toy	85	60	95	100	.372	.002*
1 Rewards absent vs present - food rewards	73	65	80	75	.239	.033
12 Hot irrelevant vs hot relevant	70	60	80	70	.387	.001*
<u>Majority correct - Grade 4</u>						
15 Think picture vs think real - picture present	65	60	60	75	.496	.001*
16 Think picture vs think real - opposite present	51.7	50	30	75	.601	.001*

TABLE 9 - continued

Item Description	Correct			Total	Corr. with	P
	All	K	2 4			
Majority correct - Grade 2						
17 Rewards absent vs present - nonfood	65	65	75	55	.496	.001*
3 Think fun vs no instruction	61.7	40	80	65	.405	.001*
Majority incorrect - All grades						
18 Relevant vs irrelevant picture	26.7	30	30	20	-.256	.024
Majority incorrect - Grades 2 and 4						
13 Cool relevant vs cool irrelevant	25	35	20	20	-.119	.182
7 Waiting vs working	20	35	20	5	.074	.287
No majority at any grade						
10 Slide present vs absent - working	53.3	55	50	55	-.173	.093
9 Reward absent vs present - food and nonfood	50	40	60	50	.473	.001*

1The facilitory strategy is always placed first in the description and the inhibitory strategy second.

TABLE 10

Mean Knowledge of Delay Strategies Score on Reduced
10-Item Questionnaire by Sex and Grade Level

	<u>Female</u>	<u>Male</u>
<u>KINDERGARTEN</u>	5.6	6.2
<u>GRADE 2</u>	7.2	7.6
<u>GRADE 4</u>	7.8	7.1

TABLE 11

**ANOVA Table for Knowledge of Delay Strategies
Questionnaire (10 items) by Sex and Grade Level**

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Main Effect	35.500	3	11.833	2.460	.073
Grade	35.233	2	17.617	3.662	.032
Sex	.267	1	.267	.055	.815
Grade X Sex	4.433	2	2.217	.461	.633
Explained	39.933	5	7.987	1.660	.160
Residual	259.800	54	4.811		
Total	299.733	59	5.080		

not differ from each other.

Individual item to total knowledge score correlations were also run separately for the kindergarten and for the grade 2 and 4 subjects. Different patterns of correlations emerged (see Table 12). At kindergarten level only seven of the items had correlations greater than .30 with the overall scores (Items 3, 4, 5, 6, 11, 15 and 16), whereas for the grade 2 and 4 groups 15 of the 18 items were shown to correlate higher than .30 with total score (Items 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16 and 17). These patterns suggest that the kindergarten children were responding in a much more random and less systematic fashion than the older children.

In addition to the item to total correlations and probability levels, Table 9 gives a description of each item, together with the percentages of subjects answering the items correctly overall and at each grade level. As half of the subjects would be expected to answer each item correctly by chance alone, it was decided that a 70% correct response rate was necessary at any grade level to indicate that the majority of children of that age have acquired knowledge of a particular "rule".

Several items met this criterion at all grade levels: Item 4 (Think fun versus think sad), Item 6 (Think fun vs think rewards - rewards present), Item 8 (Think fun vs think rewards - rewards covered), Item 11 (Cool vs hot ideation),

TABLE 12

Knowledge of Delay Strategies - Item to Total Score
Correlations for Kindergarten and Grades 2 and 4

	K (N=20)	GR 2 & 4 (N=40)		K	GR 2 & 4
Correlation (Probability)					
Item 1	-.1789 (.225)	.4240 (.003)	Item 10	.2971 (.102)	-.3982 (.005)
Item 2	-.0971 (.342)	.3732 (.009)	Item 11	.6346 (.001)	.4484 (.002)
Item 3	.3042 (.096)	.3618 (.011)	Item 12	.0883 (.356)	.5102 (.001)
Item 4	.4447 (.025)	.1263 (.219)	Item 13	.2293 (.165)	-.2468 (.062)
Item 5	.4808 (.016)	.0607 (.355)	Item 14	.2150 (.181)	.5448 (.001)
Item 6	.3199 (.085)	.4565 (.002)	Item 15	.4808 (.016)	.5079 (.001)
Item 7	-.2242 (.171)	.4468 (.002)	Item 16	.6970 (.001)	.5901 (.001)
Item 8	.0416 (.431)	.3514 (.013)	Item 17	.1739 (.232)	.6870 (.001)
Item 9	.2061 (.192)	.5733 (.001)	Item 18	.0997 (.338)	-.4307 (.003)

Item 14 (Think picture vs think real rewards - real rewards present), and Item 2 (No ideation instructions vs think rewards). Three of these items (6, 11 and 14) exceeded the .30 correlation with total score. This suggests that awareness of these cognitive strategies had already been acquired by the majority of children by age 6 and the children who scored best on the overall questionnaire were the ones who answered these items correctly. As Items 4, 8 and 2 were not highly correlated with total score, they were not retained for the analysis of the reduced 10-item questionnaire.

Some items showed a developmental progression in their acquisition. All but one of the grade 2 and 4 children were aware that having a Slinky toy to play with would facilitate delay (Item 5), whereas only 12 out of 20 kindergarten subjects answered this item correctly. This item correlated significantly with total score. Similarly, Item 12 (Hot irrelevant vs hot relevant ideation) was correctly answered by the majority of second and fourth grade but not kindergarten students, and correlated sufficiently with total score. Item 1 (Absence vs presence of food rewards) was also answered correctly by a majority of grade 2 and 4 subjects, but as it was not systematically related to total score it was not retained for the second analysis.

Two items were known only by a majority of children at the grade 4 level, Items 15 (Think picture of rewards vs think real rewards - picture present) and 16 (Think picture

of rewards vs think real rewards - opposite stimulus present), and both of these items correlated highly with total score. It was thus indicated that it is not until after grade 2 that children consolidate their knowledge of the principle that thinking about a picture of the rewards is more helpful to successful delay than thinking about the real rewards independent of the nature of the actual stimulus.

Two items were only answered correctly by a majority of children at the grade 2 level, both of which correlated significantly with total scores. These were Items 17 (Absence vs presence of non-food rewards) and 3 (Think fun vs no ideation instructions). This latter item is somewhat subjective and difficult to interpret, and it is possible that children at the different grade levels may have understood the "no instruction" condition differently.

On three items it was found that increasingly fewer subjects answered the item correctly with age. These were Item 18 (Reward relevant vs reward irrelevant pictures) which was answered incorrectly by a 70% majority at all three age levels, and Items 13 (Cool relevant vs cool irrelevant ideation) and 7 (Waiting vs working) which were answered incorrectly by a majority of subjects only at the grades 2 and 4 levels. It appeared that many of the subjects, especially the older ones, were answering these items in accordance with a general principle that distraction from the relevant rewards and from the waiting task would facilitate delay, without taking into account the nature of the stimuli

or the task. It is possible that had the task depicted in Item 7 been more interesting, it would have been found to facilitate delay as in another study where word games to do during the delay were found to make it easier for older children to wait (Corfield, Al-Issa & Johnson, 1976). It is also possible that the effectiveness of certain strategies may be age specific. As almost the entire body of delay of gratification research has been conducted with preschoolers, it is not possible to know if the same cognitive and attentional strategies facilitate successful delay at all ages. However, as these three items did not correlate adequately with total scores across all subjects, they were not included in the reduced 10-item analysis.

Two other items were responded to correctly by only about half of the total subjects and did not reach the majority criterion at any age level. In response to Item 9 (Presence vs absence of food and non-food rewards), which correlated significantly with overall score, some subjects made spontaneous remarks that suggested that the finger puppet reward depicted in this item was regarded more as a distractor than a frustration arousing temptation, although it was specified in the text that the child was not allowed to play with it during the delay. Item 10 (Presence vs absence of a reward relevant slide - working condition) did not correlate with total score and was not considered a "good" item by any criteria. It was therefore dropped from the further analysis as it appeared that subjects at none of

the grade levels tested were reliably aware that the presence of a slide of the reward relevant objects would facilitate delay in a working condition more than having no slide available for attention.

Relationship of Ability to Delay Gratification and Knowledge of Delay Strategies

The hypothesis of a relationship existing between a child's knowledge of the strategies which facilitate delay and his ability to delay gratification was not supported by the findings of the present study. Pearson Product Moment Correlation Coefficients of .067, $p = .305$, between delay time and the full 18-item questionnaire, and of $-.019$, $p = .444$, with the reduced 10-item questionnaire did not approach statistical significance. In addition, mean knowledge scores for the groups of Non-delayers, Tryers and Delayers were computed collapsing across grade levels as no significant differences due to grade had been found. An ANOVA showed that these group means (11, 11.38 and 11.4 respectively on the full 18-item questionnaire) did not differ significantly, $F(2,57) = .141$, $p = .869$ (see Table 13).

Self-Control Rating Scale

As mentioned previously, this measure was only available for the grade 4 subjects. Possible scores on this 33-item questionnaire range between a low of 33 and a high of 231. A low score indicates that the child exhibits a high degree of self-control in a variety of classroom related

TABLE 13

ANOVA Table for Knowledge of Delay Strategies by
Delay Group (Non-Delayers, Tryers and Delayers)

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Main Effect - Delay	1.506	2	.753	.141	.869
Explained	1.506	2	.753	.141	.869
Residual	303.827	57	5.330		
Total	305.333	59	5.175		

*Similar results were obtained with the reduced 10-item questionnaire. Data available from the author.

situations as rated by their teacher, whereas a high score indicates a general lack of self control. Observed scores ranged from a low of 66 to a high of 167 with a mean of 98.2 (SD = 28.9) for the girls and 93.2 (SD = 29) for the boys. A t-test showed that these means did not differ significantly, although previous research had shown boys generally scoring higher than girls. The Self-Control Rating Scale was found to be positively correlated with delay time by means of a Pearson Product Moment Correlation Coefficient, $r = .472$, $p = .018$. This would suggest that, contrary to the result anticipated, those children who were rated by their teacher as exhibiting higher degrees of classroom self-control behavior were less able to wait for their preferred reward in the delay of gratification paradigm. However, if the Bonferroni adjustment for multiple correlations is made, it becomes apparent that this correlation coefficient does not reach the .006 level ($.05/8 = .006$) required to maintain an error rate per hypothesis of .05.

Teacher ratings on the Self-Control Rating Scale were not found to be related to children's knowledge of delay strategies or to IQ.

Summary

The results of the present study did not find any evidence of a relationship between children's ability to delay gratification and their knowledge of the principles which facilitate delay, nor did they indicate any support for the hypothesis that with increasing age between kindergarten

and grade 4, children would be better able to delay gratification. However, evidence was found that children's knowledge of the strategies which facilitate delay of gratification increases with age between kindergarten and grade 2. Grade 2 and grade 4 children did not differ from each other in their overall knowledge scores, but showed significantly greater awareness of facilitating strategies than did kindergarten children. Some individual items showed developmental changes whilst others did not.

Significant sex differences were found on the measure of IQ, with males scoring higher than females, but no relationships were found between IQ and a child's ability to delay gratification or his knowledge of self-control strategies. Unexpectedly, however, at the grade 4 level a correlation was found between long delay times and a teacher rating of lack of self-control in the classroom.

DISCUSSION

The purposes of the present study were to extend our knowledge of the development of children's ability to delay gratification and awareness of delay facilitating strategies, and to increase our understanding of the relationship of these two concepts with each other and with intelligence.

Ability to Delay Gratification

This study did not find support for the hypothesis that children's ability to delay gratification increases with age between kindergarten and grade 4. By the second half of the kindergarten year just less than half of the subjects (9 out of 20) were able to wait to the full criterion time of 20 minutes in order to receive their preferred reward. By grades 2 and 4 this had increased to more than half of the subjects (13 and 14 out of 20 respectively), but these differences were not significant. A comparison of these results with those from other studies under conditions where both rewards were available for attention during delay, indicates higher proportions of subjects able to wait to criterion and longer mean delay times among the elementary school children in the present study than in previous studies with preschool age subjects.

In studies by Mischel and Ebbesen (1970) and Mischel, Ebbesen and Zeiss (1972) none of the eight and ten preschoolers respectively who were exposed to the rewards

present condition were able to wait to the criterion time of 15 minutes for small food rewards. Similarly, Yates and Revelle (1979) found that only three out of 15 preschool children were able to wait to a criterion of 20 minutes for both food and non-food rewards. Mean delay times in the present study were 12.5, 15.4 and 17.1 minutes for the kindergarten, grade 2 and grade 4 children respectively. Results from previous studies in which children were exposed to the presence of both rewards during the delay have shown mean delay times ranging from less than half a minute to 8.44 minutes (Mischel & Ebbesen, 1970; Mischel, Ebbesen & Zeiss; Mischel & Baker, 1975; Patterson & Carter, 1979).

There are two possible reasons why these differences in delay times between the preschool subjects in other studies and the kindergarten to grade 4 children in the present study may have occurred and both may also account to some extent for the failure to obtain the predicted relationship between age and ability to delay in the present study. Firstly, it is possible that a significant developmental change in the ability to delay gratification takes place between preschool age and the second half of the kindergarten year. Secondly, the present study differed from previous studies in two important ways that may have had a facilitory effect on delay.

One difference between the present and previous research was in the type of rewards offered. In the past predominantly small food rewards (marshmallows and pretzels)

have been offered, or nonfood items of little value such as pennies and tokens. The items in the present study were chosen to appeal to older as well as younger children, and great enthusiasm and interest was shown towards the reward objects by children of all ages.

Montgomery (1976) found that the choice for a larger, delayed reward, rather than an immediate smaller reward was a function of the magnitude of the rewards. It can therefore be speculated that the greater value and attractiveness of the present rewards contributed to the greater mean delay times and proportions of successful delayers found in this study. Further research could explore this relationship by varying the values of the reward objects whilst attempting to maintain similar discrepancies in value between the preferred and non-preferred items.

A second procedural difference is that the room in which our testing was done contained several sources of visual distraction, making the experimental condition more comparable to conditions in other studies where the children were provided with either an external or internal source of distraction than to the bare room initially used (Mischel & Ebbsen, 1970). In Mischel et al.'s (1972) experiment, where preschool children were provided with either a Slinky toy to play with during the delay, or instructed to think about "something that is fun", a mean delay time of 8.6 minutes was found for the former condition, and means of 12.12 and 13.3 minutes were found for the latter condition in two separate

experiments. These figures are much closer to the mean delay time of 15 minutes for all the subjects found in the present study and very comparable to the 12.5 mean delay time of the kindergarten children.

This suggestion is also substantiated by spontaneous remarks made by the children on the experimenter's return to the room after the delay, which indicated that several of the children had put the available distractors to use to help them pass the time. Children claimed that activities such as looking round the room, reading the labels and counting various items had prevented them from being bored.

There is much research to substantiate that the strategy of diverting one's attention away from the rewards by means of either overt or cognitive distractors is effective in facilitating delay (Mischel & Ebbesen, 1970; Mischel, Ebbesen & Zeiss, 1972). Mischel and Ebbesen suggest that one of the essential steps in the mastery of delay of gratification may be learning to divert one's attention away from the tempting rewards by focusing on other available stimuli which create less frustrative arousal for the individual than the highly desirable but immediately blocked rewards. They also cite evidence to suggest that even when children are apparently absorbed by the distractions, their behavior is still guided by their goal of waiting for the preferred reward. Yates and Revelle (1979), however, conceive of the waiting period as a series of decision opportunities when the child must repeatedly choose between

continuing to wait or terminating the delay, by evaluating the trade-off between the waiting time and the value of the reward. They suggest that, rather than reducing frustrative arousal, the primary function of distractors is to occupy the child so that he can ignore that there is a decision to be made and thus decrease the likelihood that he will decide to terminate. Remarks by the children that they were able to alleviate the boredom by distracting themselves suggests some support for the former hypothesis, although there is no evidence that it is related to successful delay, and both factors may play an important role.

It is felt that the present study more closely resembles a real-life delay situation than much previous research, in that distractors are usually quite freely available. Children are rarely locked away in virtually empty rooms to await gratifications. However, despite the many sources of distraction, it is interesting to note that 40% of the present sample of children were unable to make use of them to the point where successful delay was possible.

As noted previously, Mischel et al. (1972) found that cognitive distractors such as thinking about "fun" things, were more effective in facilitating delay than overt distractors, such as a Slinky toy. The present situation provided overt distraction in the form of a wide variety of articles to look at, but also provided opportunities for the generation of cognitive distractors, such as the games that some children mentioned making up, e.g. counting all the

letter A's, etc., in the labels on the shelves.

It is interesting to speculate that those children who were able to generate interesting cognitive distractions were better able to wait than those who simply looked around the room at what was available, who were in turn better able to delay than those who focused on the rewards. This could provide a fruitful area for further research, especially with regard to attempting to identify the factor or factors which make some children better able to utilize the available distractors in their own attempts to exert self-control.

In summary, the present research extends the range of the delay of gratification paradigm to include older subjects across a wider age range, reward items of greater value and a more true to life situation with regard to the availability of distractors, and shows that even with these modifications a wide range of individual differences is found which cannot be accounted for by age, intelligence or situational manipulations, and is yet to be explained by any of the current research.

Knowledge of Delay Strategies

The present study supports the work of other researchers (Mischel, Mischel & Hood, 1978; Schultz, 1981) that there is a developmental progression in the knowledge of effective delay strategies with age. It would appear that some major changes take place in this regard between kindergarten and grade 2.

The study also expands on Mischel's work by allowing us

to make more statements about the specific strategies children acquire at different ages. It was found that by kindergarten the majority of children already knew that affectively positive cognitive distractions are more effective than thinking about sad things or about the rewards. They also knew that thinking about the rewards, whether in "hot" consummatory ways or as real objects, inhibits delay. Many of these items relate to a general principle that it is better to distract one's attention away from the desirable, realistic properties of the rewards. By age 8 the children had an increased awareness of the general benefits of a variety of distraction and attentional strategies in aiding delay. They knew that it is better to think about other irrelevant objects in consummatory ways than to think thus about the rewards, and that not having the rewards present for attention and having a toy to distract oneself with make waiting easier.

It was not until grade 4, however, that children showed a consistent awareness of the principle that thinking about the rewards in the form of pictures helps delay more than thinking about the rewards as if they are real, independent of the nature of the actual stimulus.

It appeared, however, that at none of the age levels tested were the children reliably aware of the cue function that pictures and cool ideation about the relevant rewards can play in helping delay when compared to pictures and cool ideation about irrelevant objects. Nor were they aware of

the effect of the boring nature of a task in inhibiting delay as compared to simply waiting. They appeared to consider the irrelevant objects and the task more as distractors and responded to these items in terms of a general principle of distractors being facilitory.

A direct comparison of some similarities and differences between the present work and Mischel's can be made only on a few items. After describing the delay paradigm, Mischel et al. (1978) asked children to choose whether they thought having the rewards exposed or hidden would better help them to wait. They found that, whereas preschool children were choosing the inhibitory response of having the rewards exposed more often (58% exposed vs 42% hidden), by grade 3 children were systematically choosing the correct response of having the rewards hidden (30% exposed, 70% hidden). By grade 6 only 23% chose the exposed and 77% chose the hidden rewards. These findings are supported by responses to Item 1 (Absence vs presence of food rewards) in the present study, which showed that, whereas a majority of the grade 2 and 4 subjects were aware that having the rewards hidden would be facilitory (80% and 75% respectively), the 70% majority criterion was not reached at the kindergarten level (35% exposed, 65% hidden). However, they were not showing the preference for the counterproductive strategy exhibited by Mischel's preschoolers. Findings from both of these studies suggest that knowledge of this rule is acquired sometime between the age of 6 and 8.

A second comparison can be made between Item 11 (Cool vs hot ideation) in the present study and Mischel's procedure of asking the children whether, if the rewards had to be present, it would help them to wait longer by thinking about how yummy and sweet and chewy marshmallows taste, or thinking that they are like puffy white clouds. By this procedure they found that 47.6%, 51.5% and 81% of the preschool, grade 3 and grade 6 children respectively showed a preference for cool ideation. They concluded that it was not until grade 6 that children have a systematic understanding of the rule that thinking about the arousing, consummatory properties of rewards inhibits delay. In contrast, the present study found that, from as young as kindergarten, children showed an awareness of this rule - 70% of kindergarten, 90% of grade 2 and 80% of grade 4 subjects answered this item correctly.

The differences in findings between these two studies may have been due to the visual mode of presentation of the items in the present study as compared to Mischel et al.'s purely verbal explanations. In addition, it is possible that the children in this study had learned from their own recent experience that thinking about the rewards in hot ways was not helpful to delay and were able to generalize that information to the item. Mischel's children did not have their own immediate experience in a similar situation to draw on in making their choices.

Finally, Mischel et al. also found a positive correlation between age and a total knowledge score derived

from their three items of .45 ($p < .001$), which is substantiated by a correlation of .29 ($p = .01$) between the 10-item questionnaire and age, and by a correlation of .25 ($p = .025$) with the full 18-item questionnaire.

In summary, it can be stated that studies conducted over the past decade to investigate children's ability to delay gratification have established a body of "rules" about some of the conditions which facilitate and inhibit successful delay and this has provided objective criteria against which children's developing knowledge of delay strategies can be evaluated (Mischel, Mischel & Hood, 1978). A major contribution of the present study has been to develop a new methodology for this purpose, which is an extension of Mischel, Mischel and Hood's preliminary investigations using three pairs of verbally presented, forced-choice items. This new questionnaire is comprised of many more items providing a much more comprehensive coverage of the available research base. The items are presented pictorially as well as with an accompanying verbal explanation to facilitate their comprehension by a wide age range of subjects. In addition, in the present experiment, the subjects had their own experience in a comparable delay situation to draw from in making their choices. Whether this change from previous procedure has an effect on the choices made is a question for further research.

Additional experiments should also be conducted so that the item analysis and some reliability and validity

studies can be conducted on a separate sample of subjects from that used to test the hypothesis of age differences in knowledge of strategies. However, the two procedures were conducted on the same sample in the present study and the post hoc consistency analysis adds some important and meaningful information about the way the different grade levels respond to the questionnaire, showing that whereas the kindergarten children were responding quite randomly on many items, the grade 2 and 4 children were much more systematic and responded according to their understanding of some basic principles of effective delay.

Relationship of Ability to Delay Gratification to Children's Knowledge of Delay Strategies

An important finding of the present study is that although children acquire a quite sophisticated understanding of the kinds of strategies which facilitate successful delay of gratification between kindergarten and grade 2, this does not appear to have a major impact on their behavior in a delay situation. It is interesting to speculate as to why this might be. Much research has shown that there is a general inconsistency between the way people respond to questionnaires and their actual behavior in situations relating to those questionnaires (Mischel, 1974). In addition it is surely one cognitive process to be able to recognize a facilitory versus an inhibitory strategy when presented with a choice, quite a different process to be able

to generate such strategies in a given situation.

The relevance of the particular strategies depicted on the questionnaire to everyday situations might also be questioned. One may ask how many dieting adults think of the strategy of imagining their desired foods as pictorial representations rather than as the real foods in order to help themselves delay, whereas they may recognize this as a more facilitory strategy when presented with a choice. And how many would spontaneously think of the strategy of likening cream puffs, for example, to puffy clouds, rather than thinking about eating them.

Many of the strategies researched and depicted in the Knowledge of Delay Strategies Questionnaire do not relate very directly to the kinds of strategies which children have been observed to spontaneously utilize such as making up games, playing with their fingers, singing, etc. and those that children have mentioned generating, such as devaluing the rewards (imagining them with "worms crawling all over") (Mischel, Ebbesen & Zeiss, 1972; Mischel, Mischel & Hood, 1978; Yates & Mischel, 1979; Schultz, 1981). Perhaps an interesting direction for future research would be to explore further the kinds of strategies children are able to generate themselves, work that has been started by Mischel and his colleagues, and how these relate to their ability to delay gratification, as well as to intelligence, age and other measures of self-control. It is perhaps important to keep in mind the interplay between individual subject

variables and situational variables in the determination of self-regulatory behaviour. We have acquired a considerable body of knowledge about some of the situational factors which affect delay of gratification, but very little research has yet been done to identify the specific subject variables which are contributory.

Another possible reason why the present study did not find support for the hypothesis of a relationship between knowledge and ability may be that awareness of the particular strategy most applicable to the present delay situation, that of using available distractors to facilitate delay, had already been acquired by the majority of subjects in the present study. In order to properly test the hypothesis of such a relationship between knowledge and behavior, it would be necessary to set up a delay situation where the subject has access to particular strategies which fewer of the subjects know.

It is also possible to speculate about the validity of the delay paradigm as a measure of self-control, as it has not been shown to be related in a systematic way to other self-regulation measures (Toner, Holstein & Hetherington, 1977), or even to a preference for delayed rewards (Mischel, 1974). It is possible that, whatever is being measured by the delay paradigm, it is not what is generally considered as an important aspect of self-control behavior. Self-control has proved to be a rather difficult concept to operationalize, as it is generally thought to be made up of

such diverse qualities as resistance to temptation, persistence, altruism, motor control and planning, as well as delay of gratification. In addition many other constructs relate to these specific components, such as assertiveness, impulsivity, locus of control, passivity and compliance, and is therefore very subject to societal values. Is a child exhibiting the ability to delay gratification when he successfully waits for his preferred reward or is he responding to other factors such as pleasing the experimenter, staying out of the classroom as long as possible, his own passive disposition, or shyness which prevents him from summoning the experimenter back?

The present study found a negative, though not significant correlation between the ability to delay gratification and the ability to self-control in the classroom as rated by the teacher. It would therefore seem that these two measures are reflecting very diverse views as to what is meant by self-control and further points out the very specific nature of the component constructs.

Summary

The present study provides a new methodology for assessing children's knowledge of delay facilitating strategies. Further work is needed to establish the reliability and validity of this measure. However, preliminary findings do suggest that knowledge of delay strategies increases with age between 6 and 8 years, and they provide information about developmental trends in the

acquisition of individual delay rules. These results do not indicate any systematic relationship between knowledge of delay strategies and intelligence within the sample tested.

The ability to delay gratification in a situation with freely available distractors was not shown to increase significantly between the ages of 6 and 10 years. No relationship was seen to exist between children's knowledge of delay facilitating strategies and their ability to delay gratification.

Interesting areas for further research suggested by the present study would be the investigation of children's differing abilities to generate cognitive strategies to mediate delay, and further work to establish greater construct validity for the present delay paradigm, as well as the development of a different measure of delay of gratification which might relate more closely to children's behavior outside of the specific experimental situation.

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APPENDIX A

**LETTER TO PARENTS DESCRIBING THE STUDY AND
CONSENT FORM FOR PARENTS TO SIGN**

CONSENT FORM

Donna White, Ph.D. - Supervisor,

Sophie Slade - Researcher

I do/do not give my consent for my child _____

to participate in a study on delay of gratification to be conducted at _____ School. I have been informed of the nature of this study and am aware that my child may withdraw at any time.

Signature _____
(Parent or Guardian)

Date _____

First language: English _____ French _____ Other _____

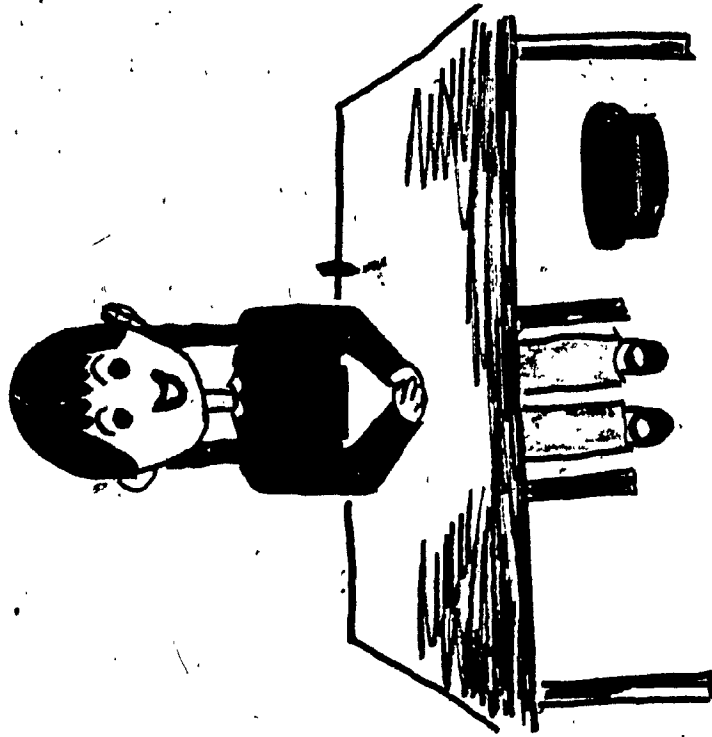
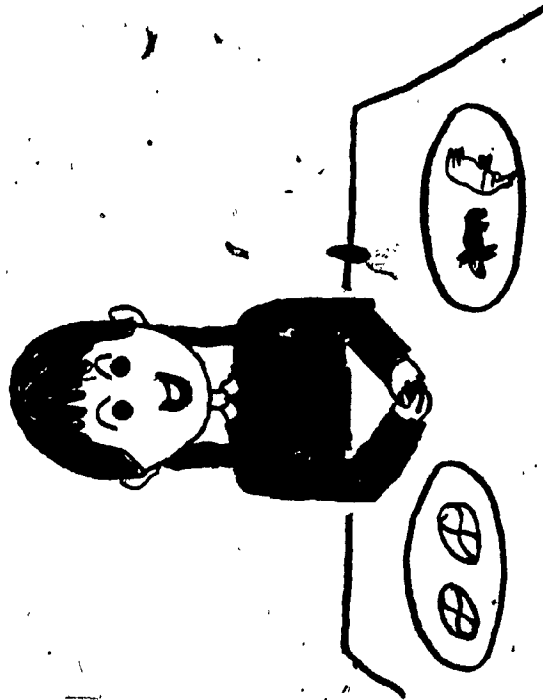
Date of Birth: _____

Grade: _____

APPENDIX B

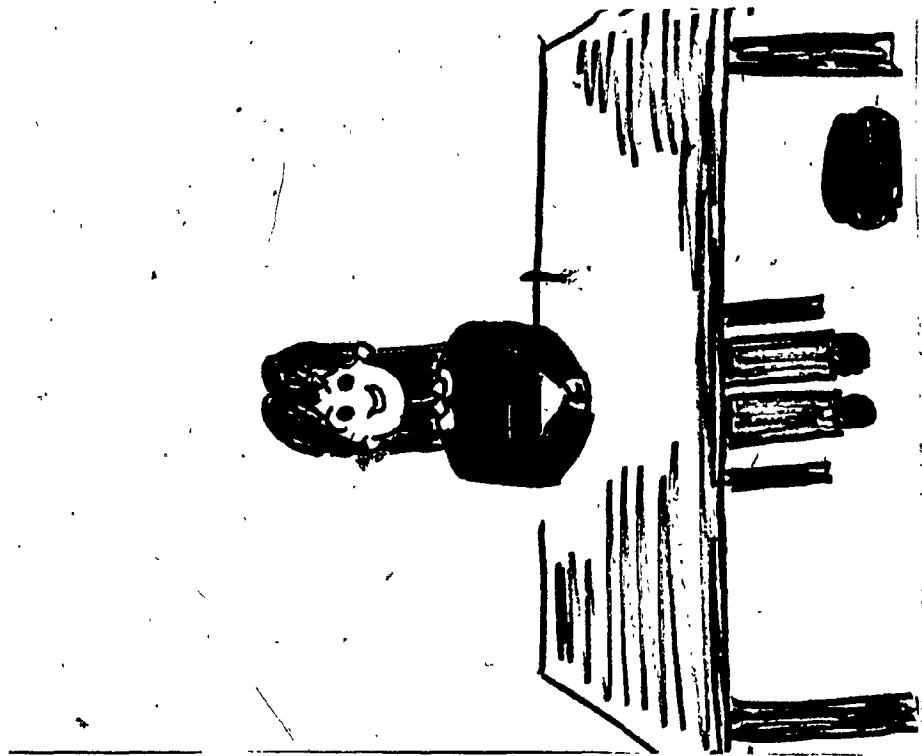
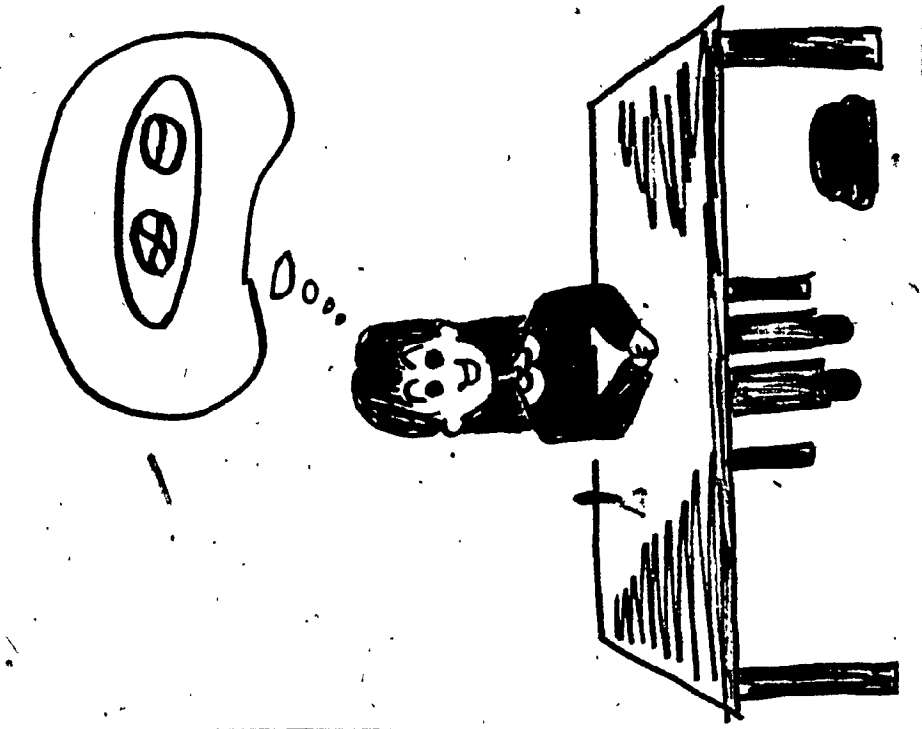
**KNOWLEDGE OF DELAY STRATEGIES QUESTIONNAIRE
(Female version)**

Item 1. These girls have been given a choice between pretzels and animal cookies. They have both seen the prizes for which they are waiting. Whilst this girl waits the prizes are on the table so that she can look at them whilst she is waiting. Whilst this girl waits they are hidden out of sight under the table. Which girl do you think will be able to wait longer? (Mischel & Ebbesen, 1970).

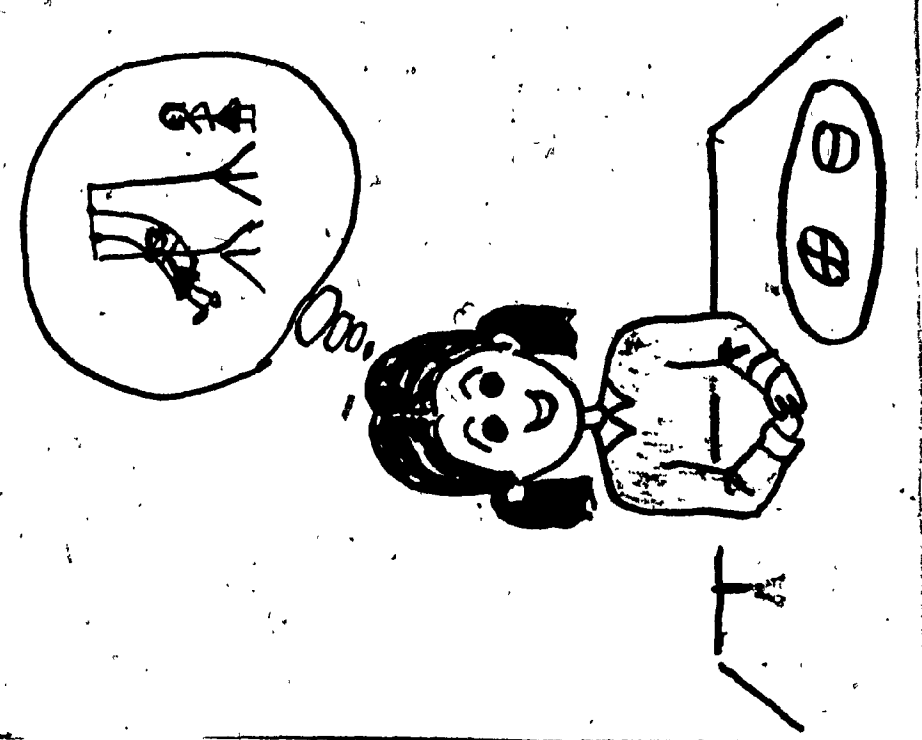
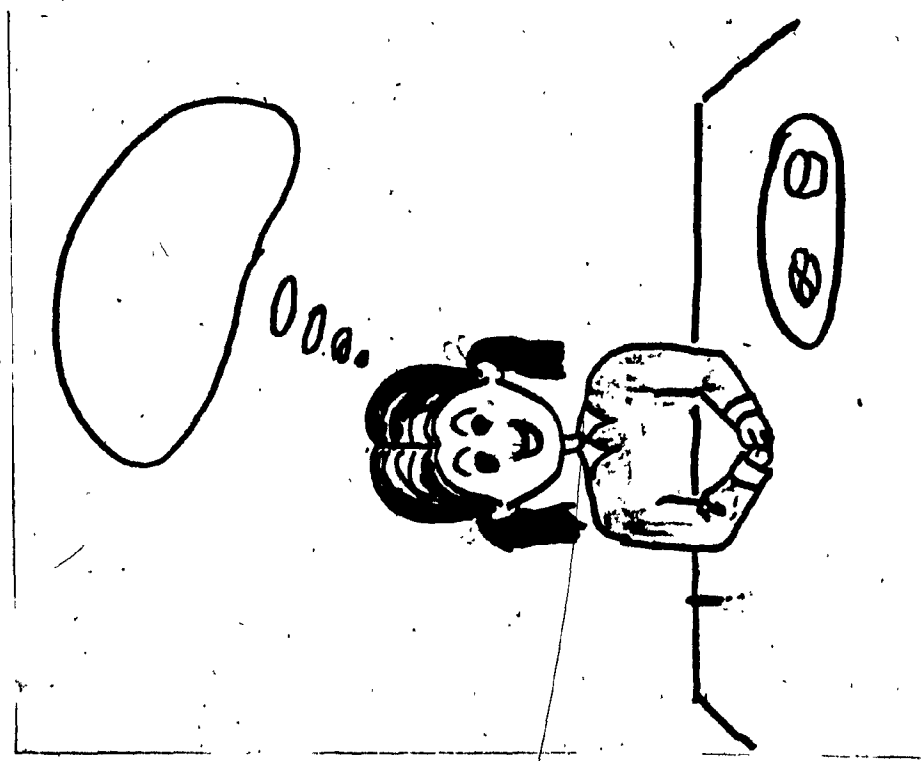


Item 2. These girls have a choice between a pretzel and a marshmallow. If they ring the bell and call the lady back they get the pretzel, which they don't like as much. If they wait until the lady comes back by herself they get the marshmallow which they like more.

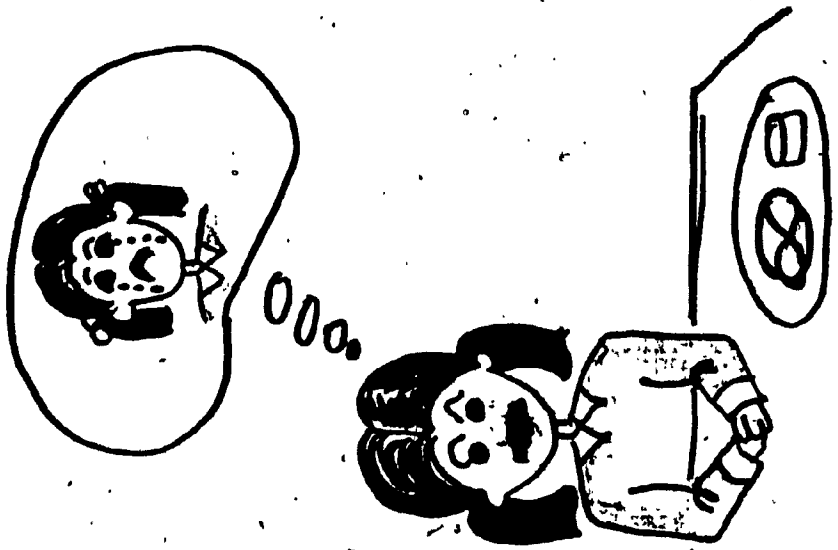
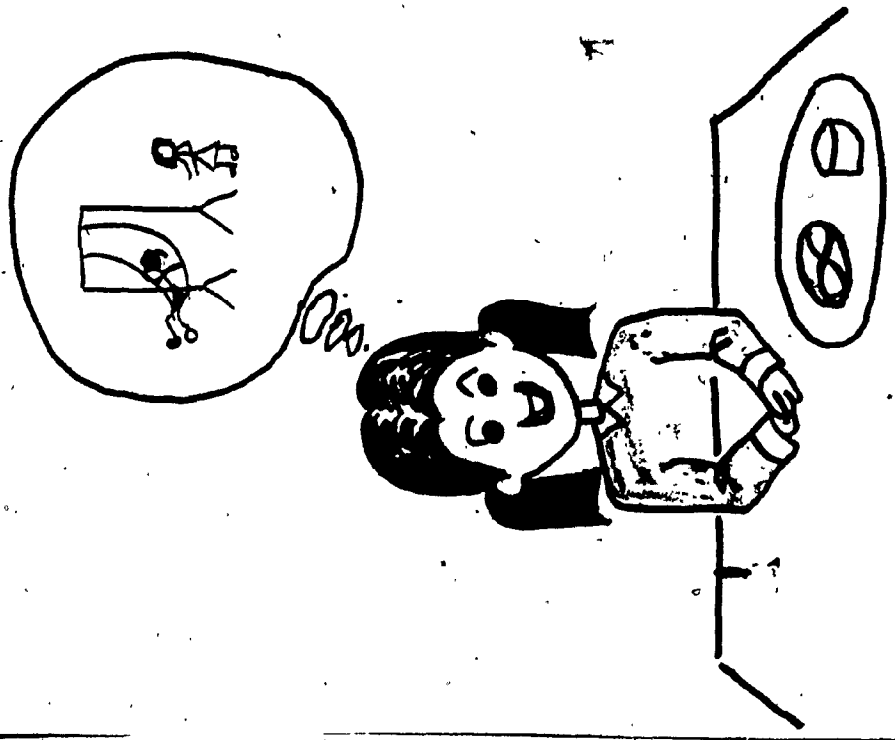
This girl is thinking about the prizes whilst she is waiting, and this girl is not thinking about the prizes whilst she is waiting. Which girl do you think will be able to wait longer?
(Mischel, Ebbsen & Zeiss, 1972 - Experiment 2)



Item 3. These girls also have a choice between a pretzel and a marshmallow. This girl has not been told to think about anything in particular whilst she is waiting. This girl has been told to think about doing something that is fun, such as her mother pushing her on the swing, whilst she is waiting. Both girls have the prizes on the table in front of them. Which girl do you think will be able to wait longer?
 (Mischel, Ebbsen & Zeiss, 1972 - Experiment 1).

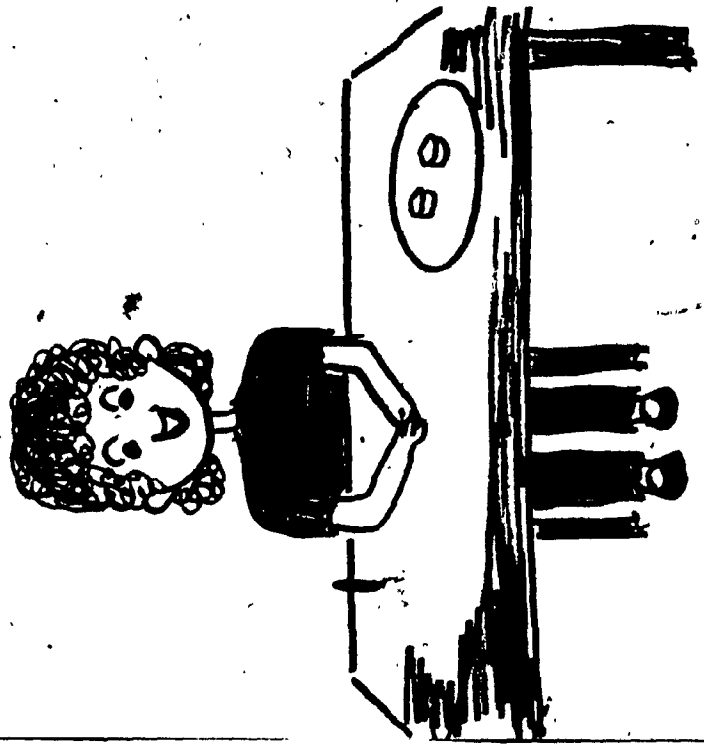
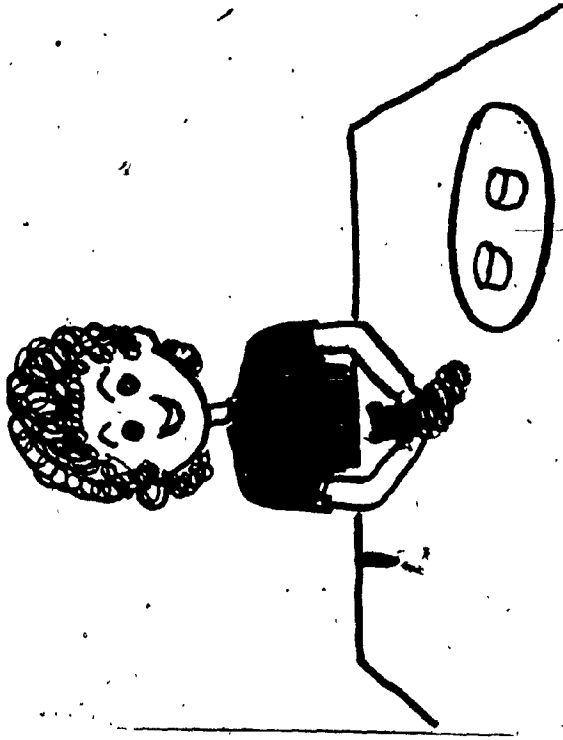


Item 4. These girls also have a choice between a pretzel straight away by ringing the bell, or a marshmallow later when the lade returns by herself. This girl is thinking about something that is fun, her mother pushing her on the swing, and this girl is thinking about something sad. Which girl do you think will be able to wait longer?
(Mischel, Ebbsen & Zeiss, 1972 - Experiment 2).

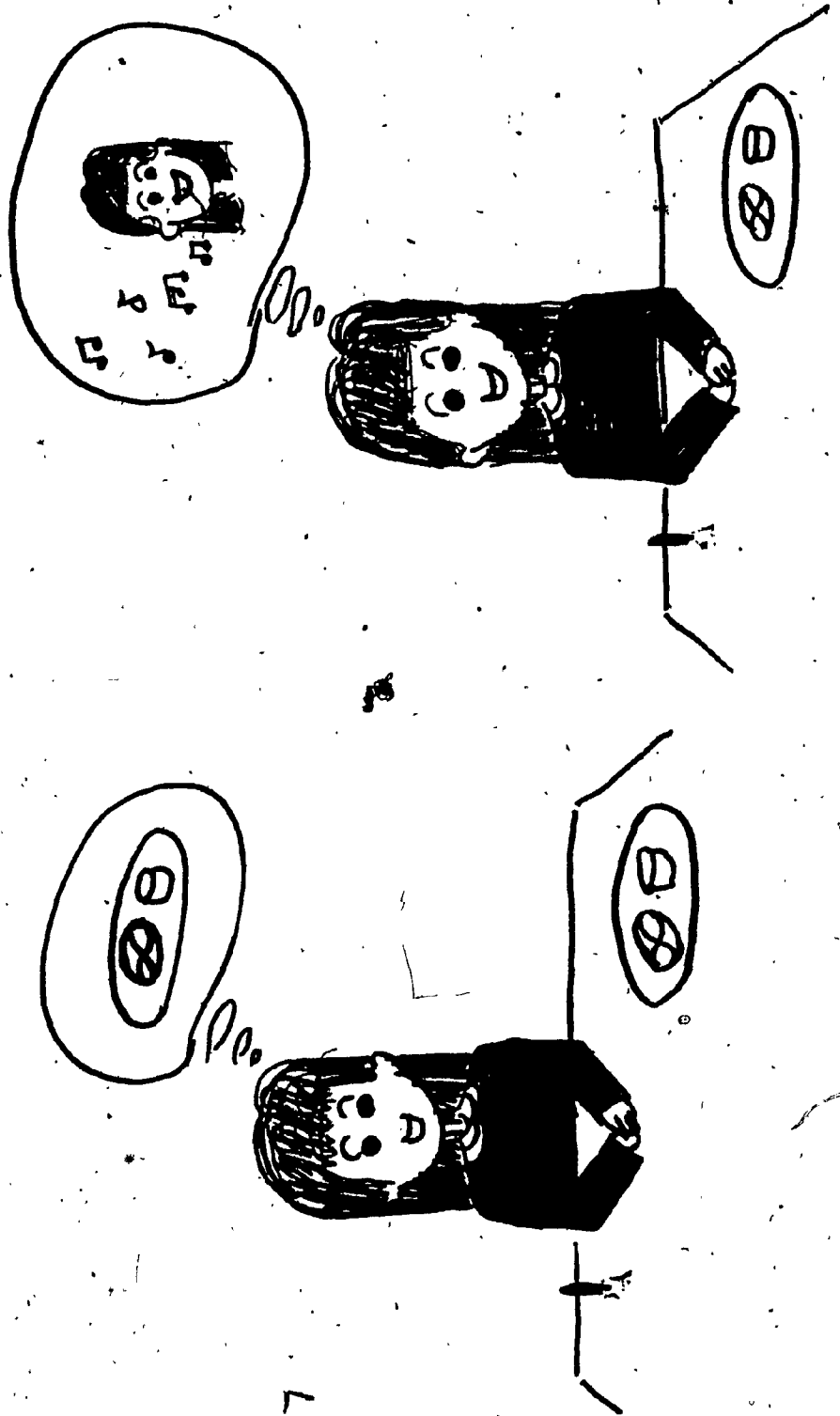


Item 5. These girls have a choice between one or two marshmallows. If they ring the bell they get one marshmallow. If they wait they get two marshmallows. This girl has a Slinky toy to play with whilst she is waiting. This girl has no toy to play with whilst she is waiting. Which girl do you think will be able to wait longer?

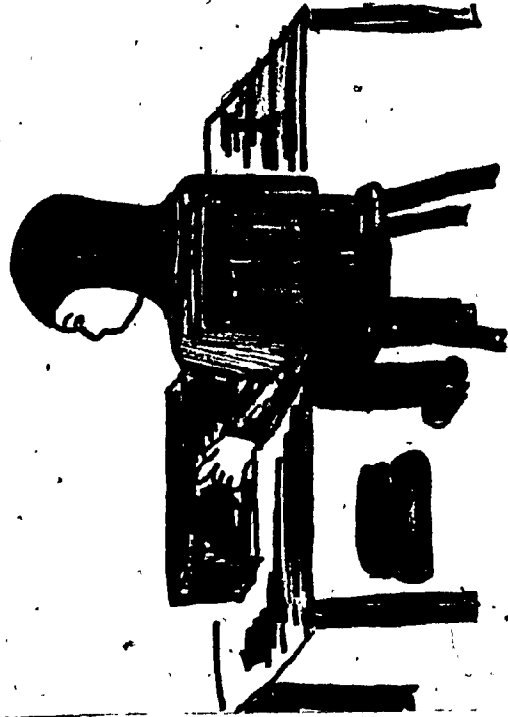
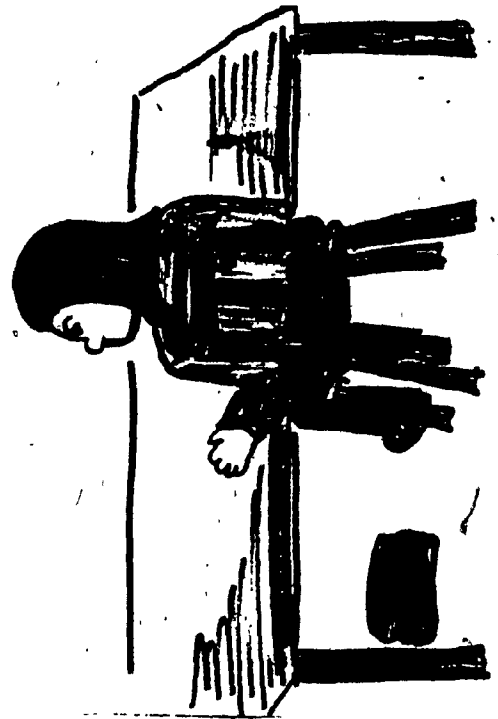
(Mischel, Ebbsen & Zeiss, 1972 - Experiment 1).



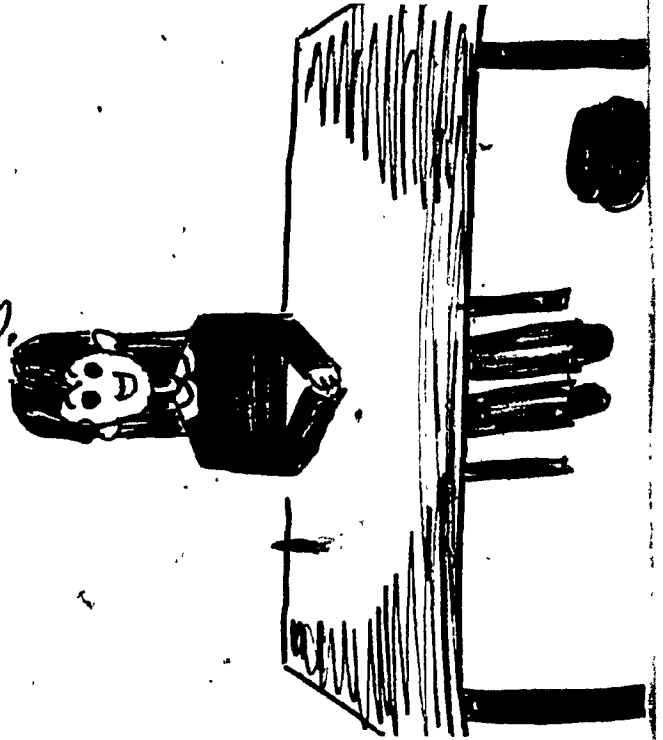
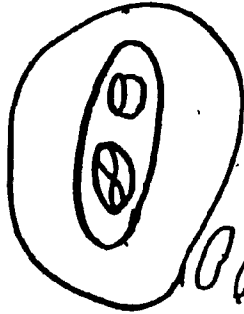
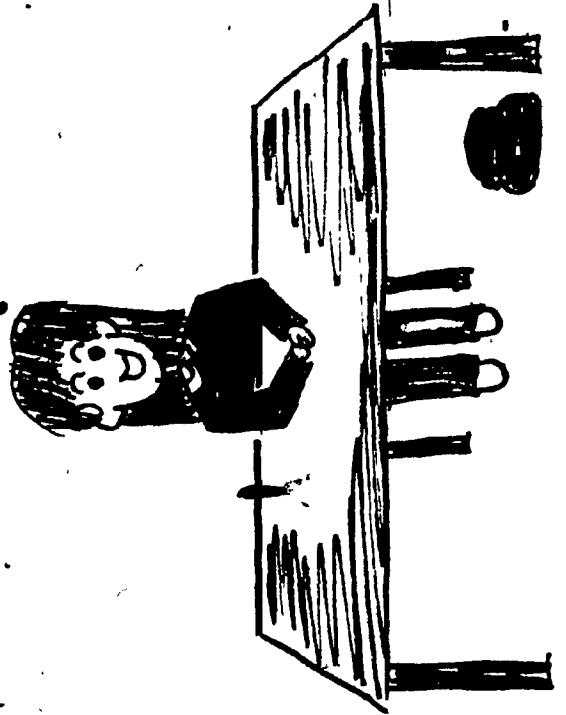
Item 6. These girls have a choice between a marshmallow and a pretzel. This girl is thinking about the prizes whilst she is waiting, and this girl is thinking about doing something fun, like singing a song. Which girl do you think will be able to wait longer?
(Mischel, Ebbsen & Zeiss, 1972 - Experiment 2).



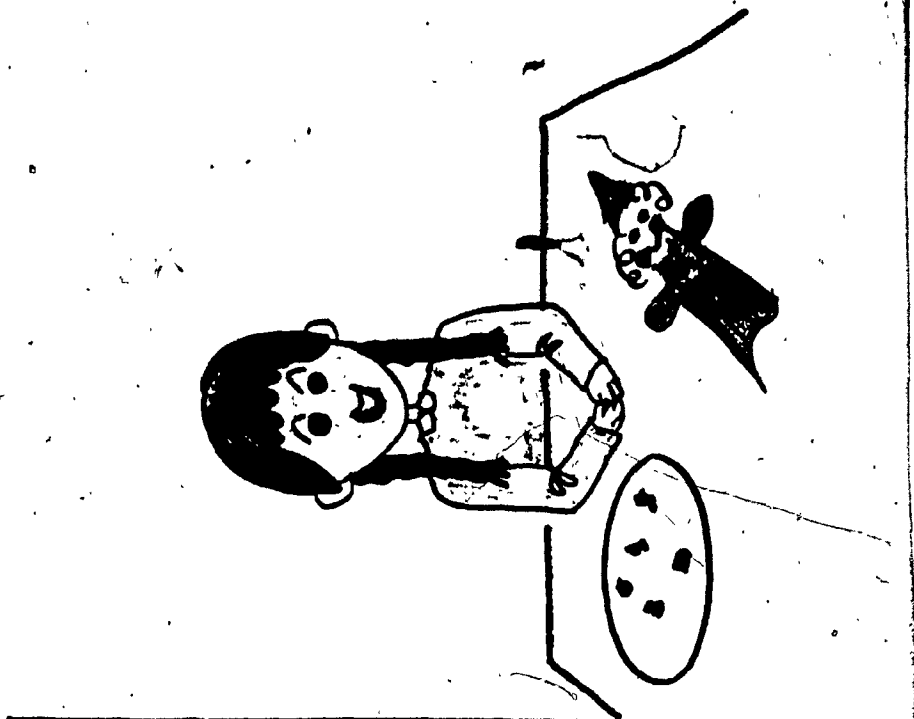
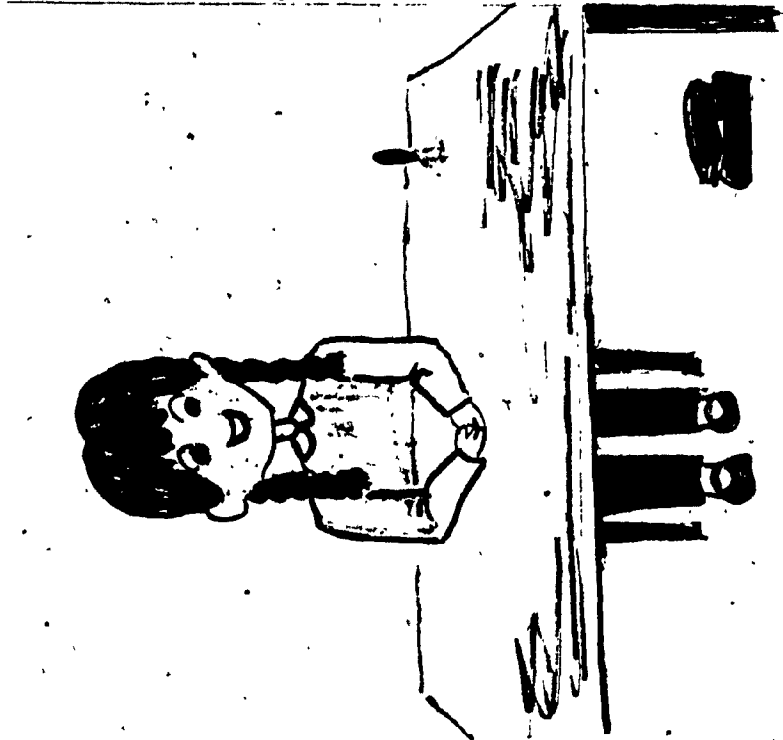
Item 7. These girls get one pretzel if they ring the bell, or two marshmallows if they wait until the lady returns by herself. The prizes are hidden out of sight in the box under the table so they can't look at them whilst they are waiting. This girl has nothing to do whilst she is waiting. This girl has to keep pressing a button up and down the whole time she is waiting. Which girl do you think will be able to wait longer? (Mischel & Moore, 1973).



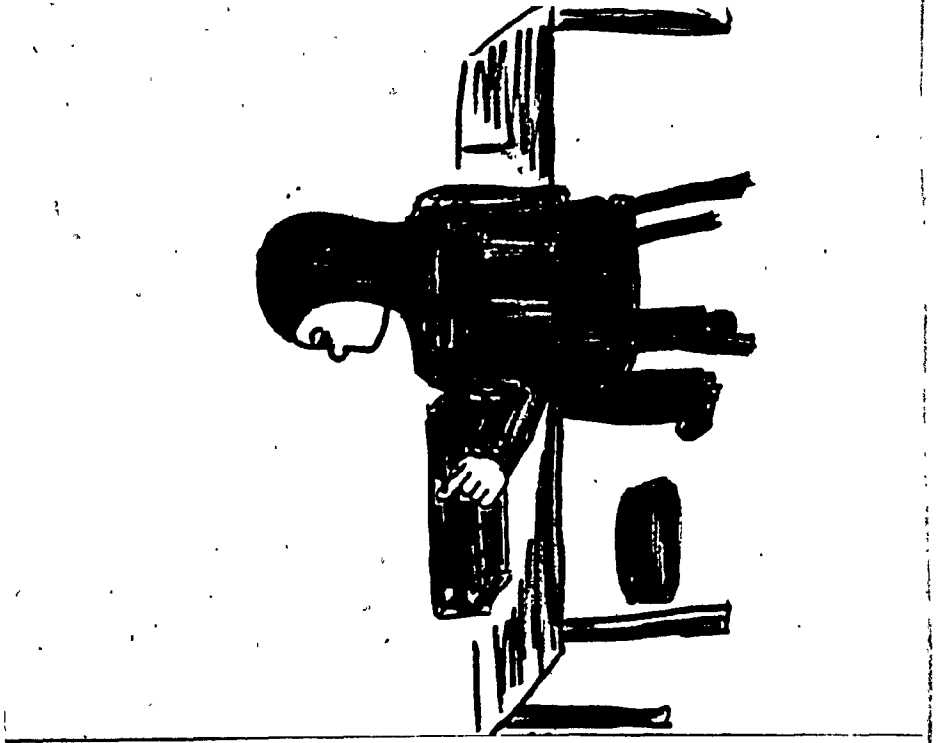
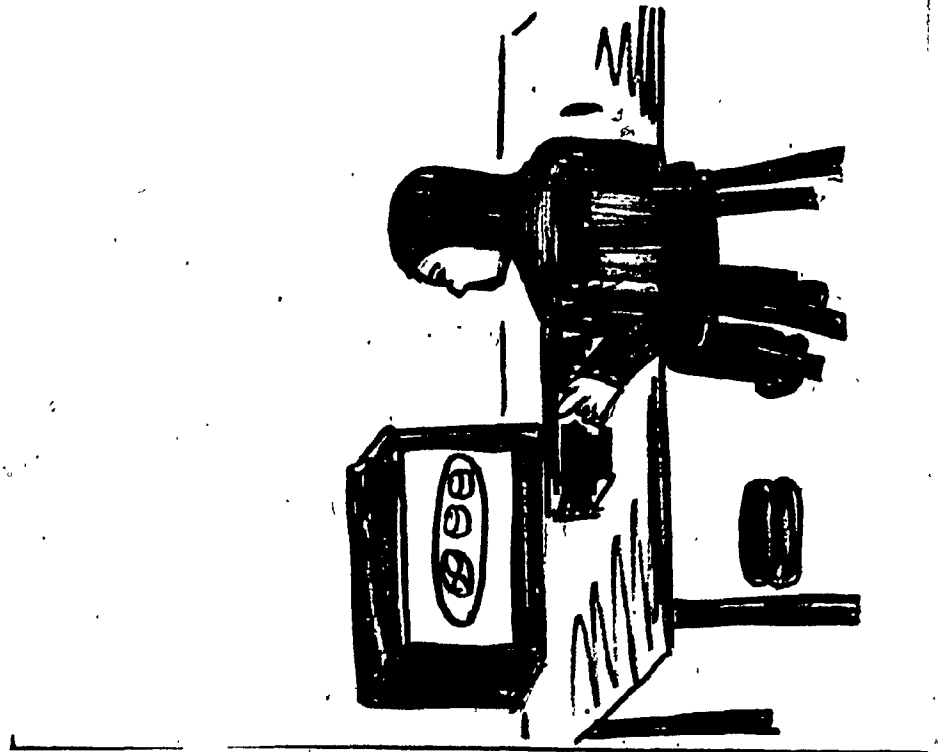
Item 8. These girls have a choice between one pretzel and one marshmallow. They have both seen the prizes for which they are waiting but they are hidden in the box out of sight under the table whilst the girls are waiting. This girl is thinking about doing something fun, like singing a song whilst she is waiting. This girl is thinking about the prizes for which she is waiting. Which girl do you think will be able to wait longer? (Mischel, Ebbsen & Zeiss, 1972 - Experiment 2).



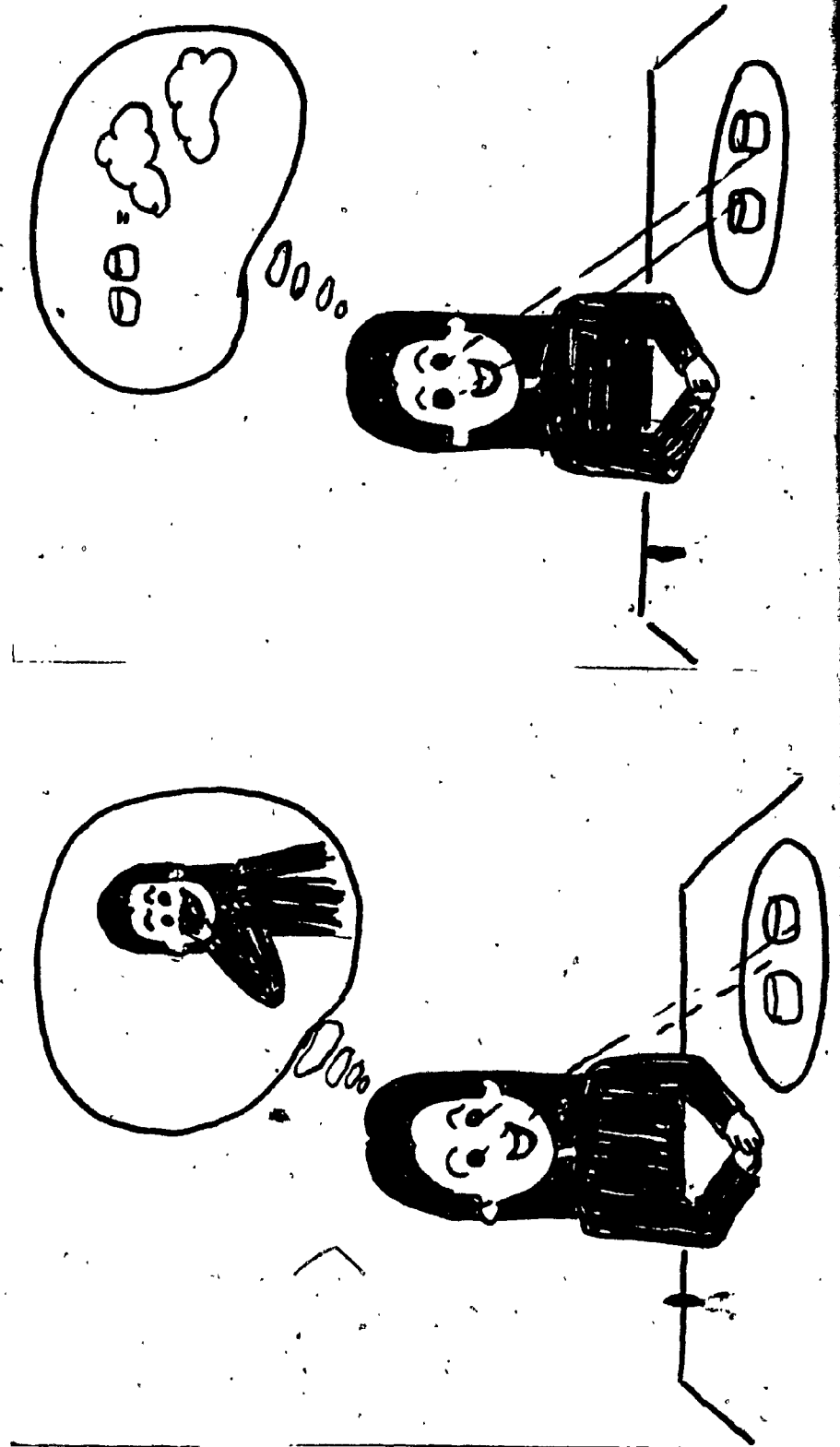
Item 9. These girls have a choice between some raisins and a finger puppet. If they wait until the lady returns by herself they get whichever prize they like best - probably the finger puppet, do you think? If they call her back they get the other prize. Both girls have seen the prizes they are waiting for. Whilst this girl waits the prizes are hidden in the box under the table. Whilst this girl waits the prizes are on the table in front of her. She can look at them but she can't play with them whilst she is waiting. Which girl do you think will be able to wait longer? (Yates and Revelle, 1977).



Item 10. These girls have a choice between waiting until the lady returns for 2 marshmallows, or ringing the bell and getting 1 pretzel. They both have the prizes hidden out of sight under the table. They both have to push a button up and down the whole time they are waiting. This girl has a picture of the prizes for which she is waiting in front of her whilst she waits. This girl has no picture. Which girl do you think will be able to wait longer?
(Mischel & Moors, 1973).

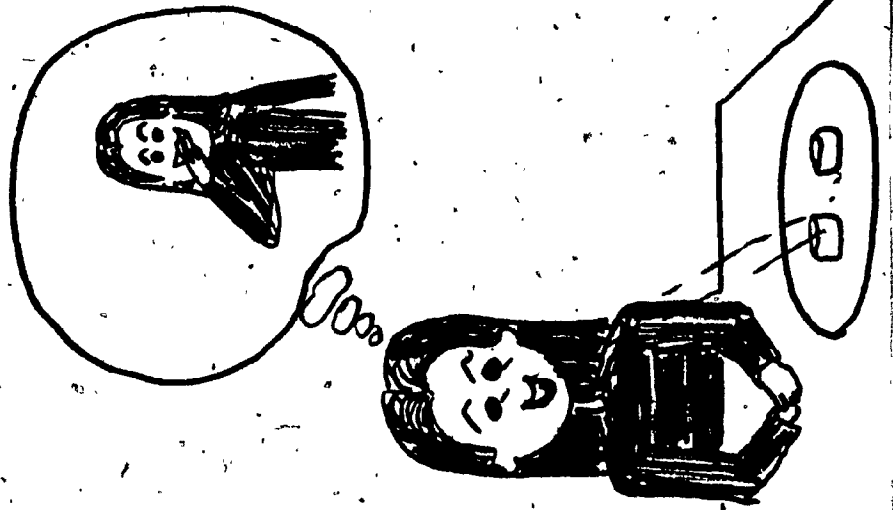
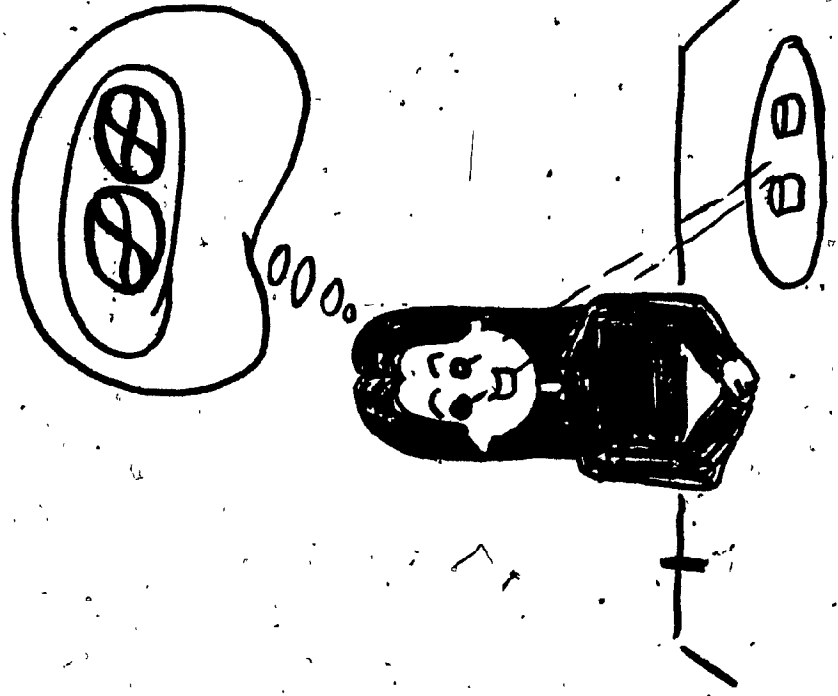


Item 11. These girls have a choice between 1 marshmallow if they ring the bell and call the lady back, or 2 marshmallows if they wait until she returns by herself. They both have the prizes on the table in front of them. This girl is thinking about eating the marshmallows and how yummy they are going to taste. This girl is thinking that marshmallows are like puffy white clouds. Which girl do you think will be able to wait longer? (Mischel & Baker, 1975).

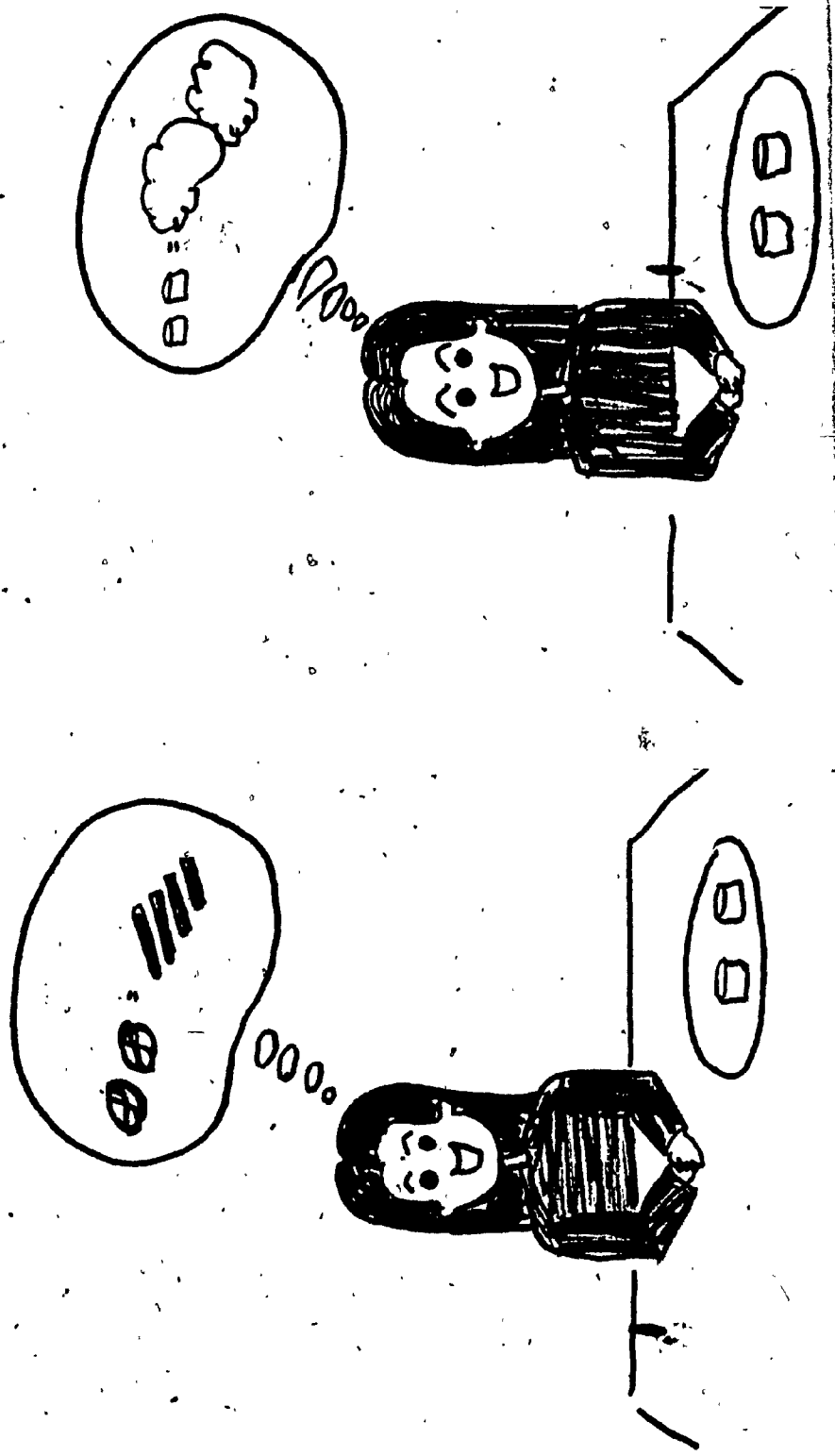


Item 12. These girls are also waiting for either 1 or 2 marshmallows. The marshmallows are on the table whilst they wait. This girl is thinking about eating pretzels, how salty they are and how nice and crunchy. This girl is thinking about eating the marshmallows and how sweet and chewy they are going to be. Which girl do you think will be able to wait longer?

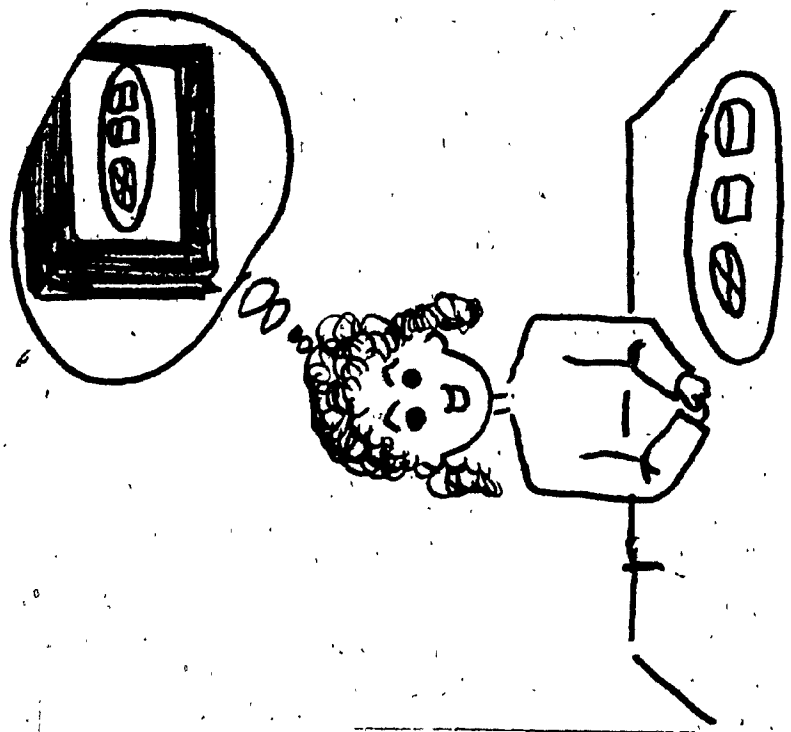
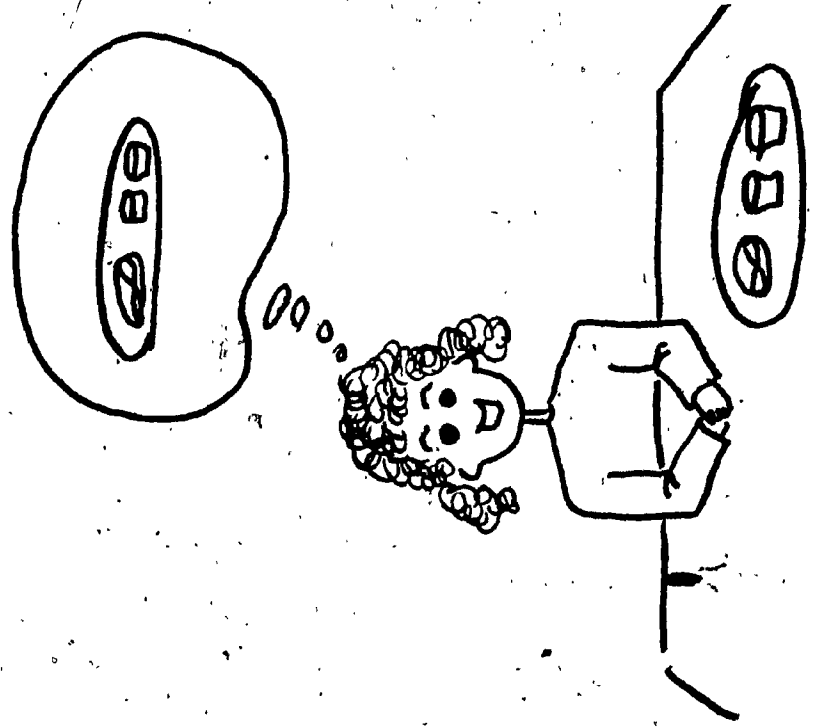
(Mischel & Baker, 1975).



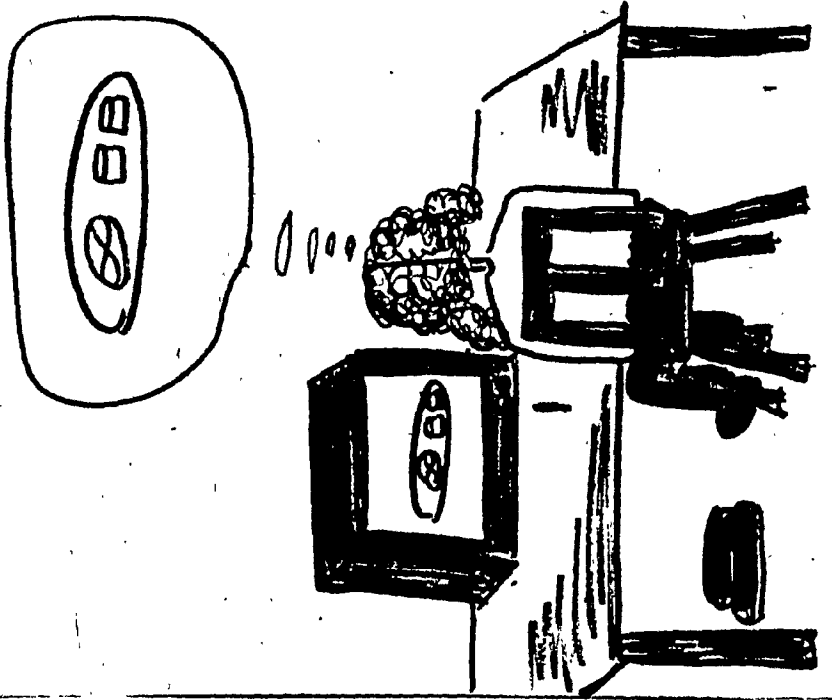
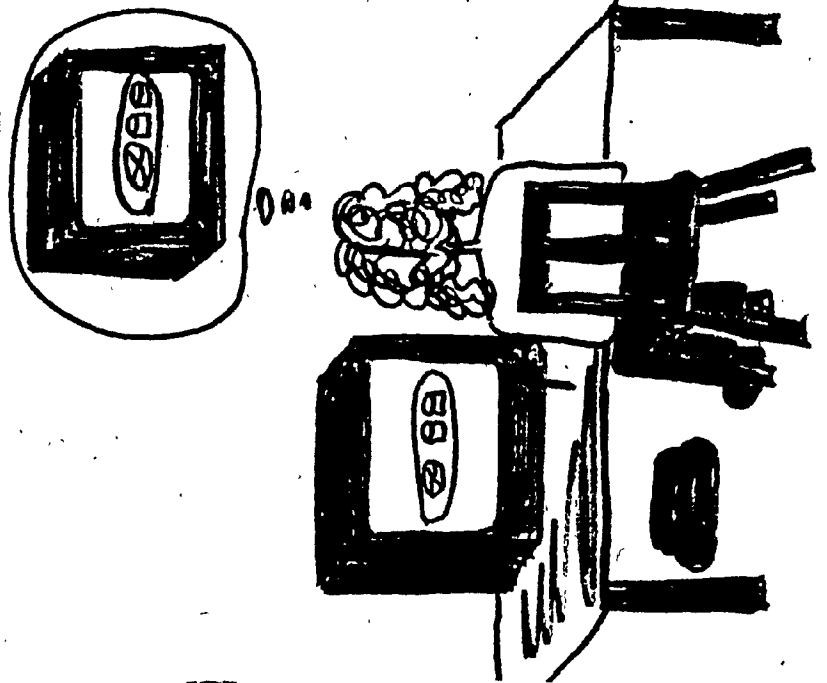
Item 13. Here are some more girls who are waiting for either 1 or 2 marshmallows, which are on the table in front of them whilst they wait. Whilst this girl is waiting she is thinking that pretzels are like sticks or logs. Whilst this girl waits she is thinking that marshmallows are like puffy white clouds. Which girl do you think will be able to wait longer? (Mischel & Baker, 1975).



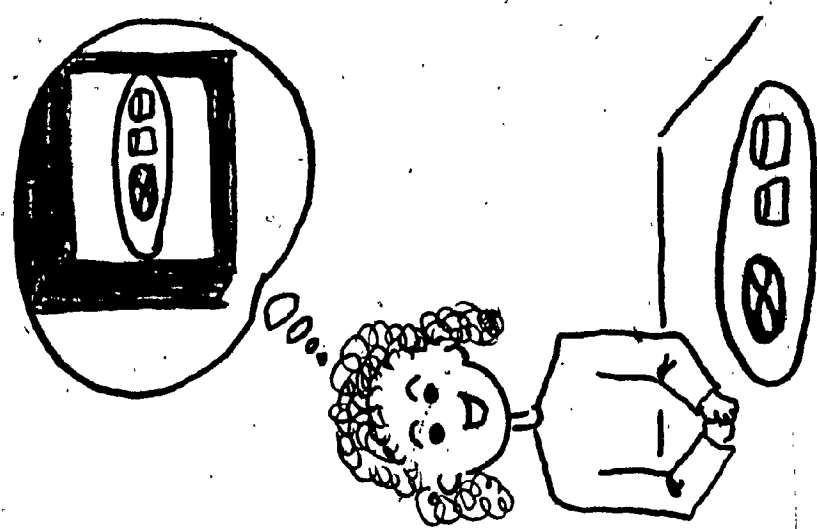
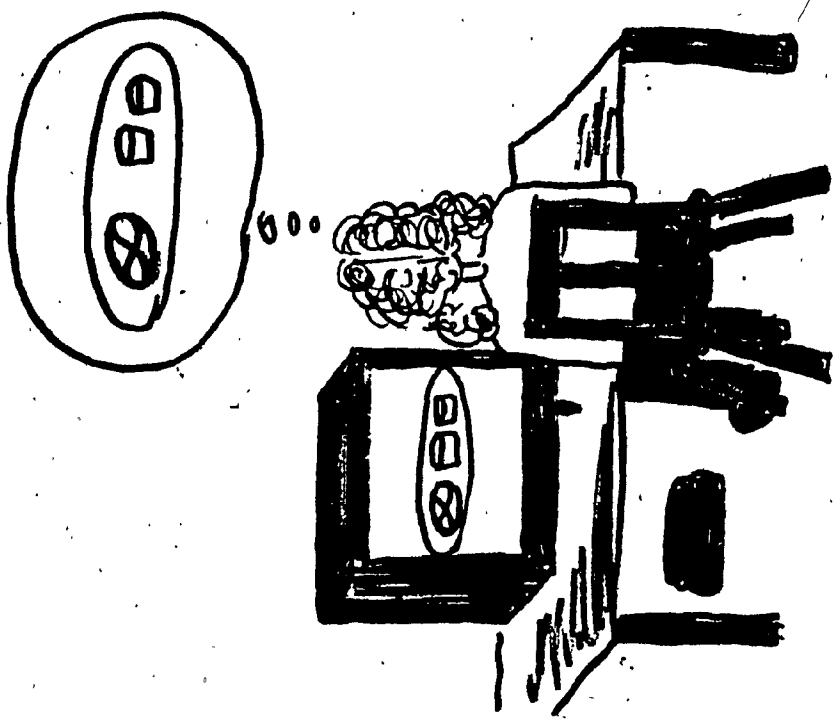
Item 14. These girls have a choice between 1 pretzel or 2 marshmallows. Both have the prizes on the table in front of them whilst they are waiting. This girl is thinking about the real prizes that are on the table. This girl is pretending that the prizes aren't real but that she is looking at a picture of the prizes. Which girl do you think will be able to wait longer?
(Moore & Mischel, 1976).



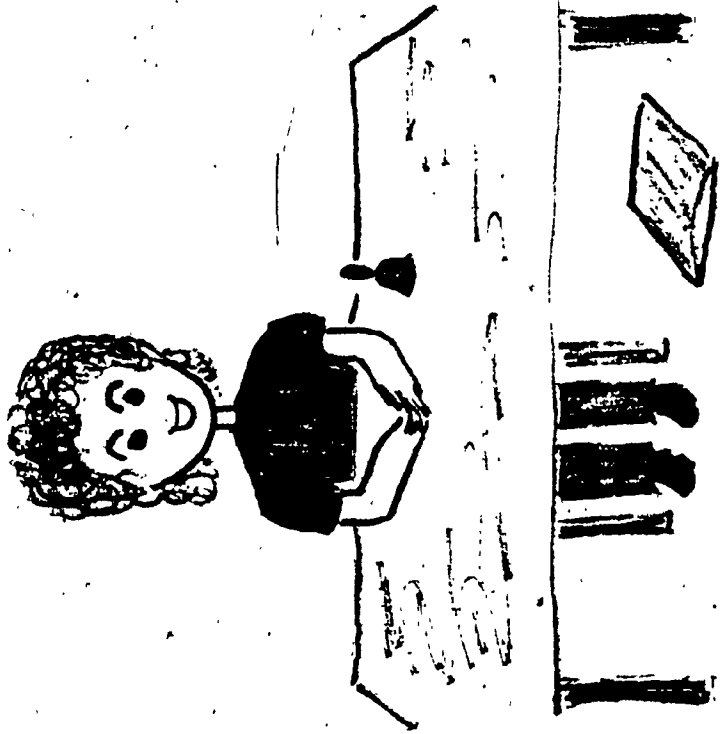
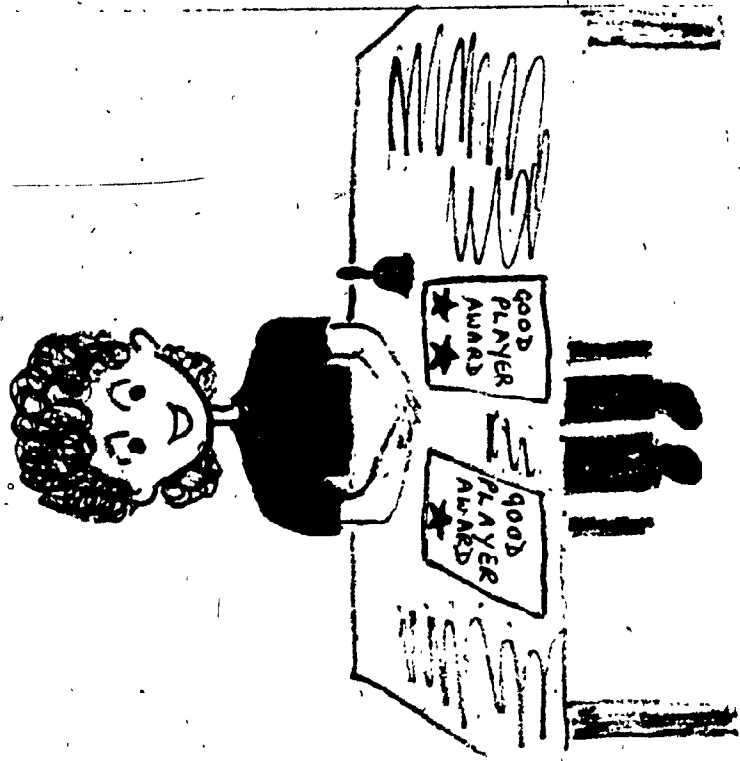
Item 15. Here are some more girls who are waiting for either 1 pretzel or 2 marshmallows but this time the prizes are out of sight under the table. Both girls have a picture of the prizes on the table to look at whilst they are waiting. This girl is thinking about the picture of the prizes whilst she waits. This girl is pretending that the picture is really the real prizes as if she could really touch and feel them. Which girl do you think would be able to wait longer?
(Moore & Mischel, 1976).



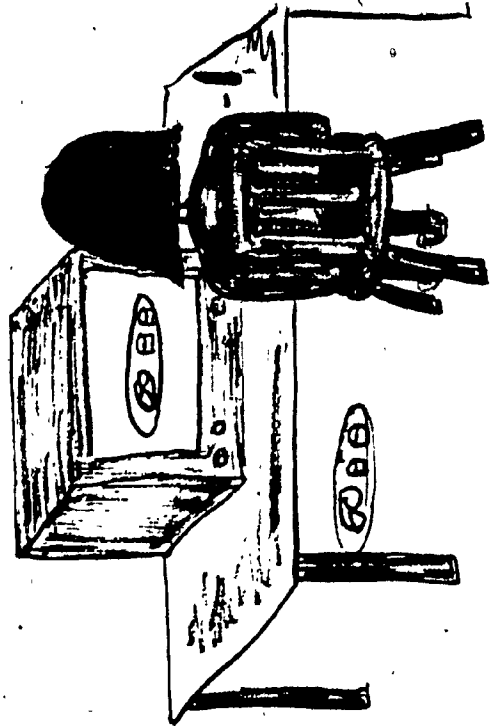
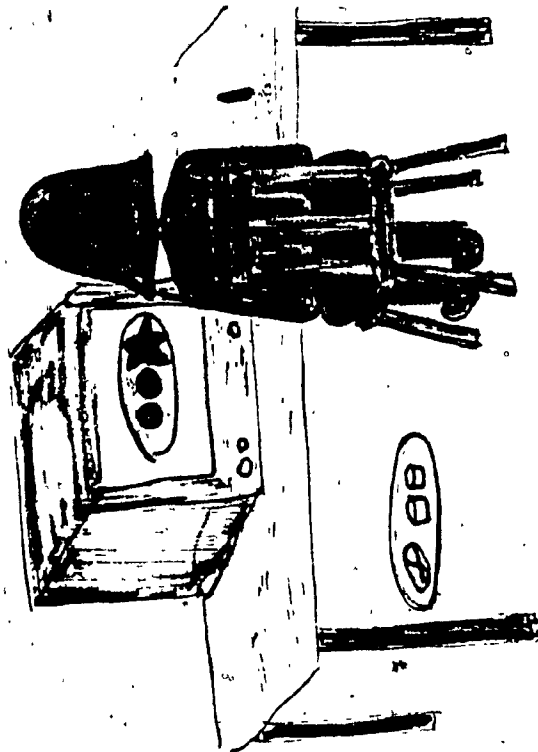
Item 16. Here are two more girls waiting for the same things. This girl has the real rewards on the table in front of her but she is pretending that she is looking at a picture of the rewards. This girl has a picture of the prizes in front of her, but she is pretending that she is looking at the real prizes. Which girl do you think would be able to wait longer? (Moore & Mischel, 1976).



Item 17. These girls are waiting for Good Player Awards. If they ring the bell and call the lady back they get the 1 star award. If they wait until she returns by herself they get the 2 star award. This girl has the awards on the table in front of her whilst she is waiting. This girl has the awards hidden out of sight under the table whilst she is waiting. Which girl do you think will be able to wait longer?
(Patterson & Carter, 1979).



Item 18. These girls are both waiting for a pretzel or 2 marshmallows. The prizes for which they are waiting are hidden out of sight under the table. This girl has a picture of some pennies and a star to look at whilst she is waiting. This girl has a picture of the prizes to look at. Which girl do you think will be able to wait longer?
(Mischel & Moore, 1973).



APPENDIX C

SELF-CONTROL RATING SCALE FOR CHILDREN

BEHAVIOR RATING SCALE FOR CHILDREN

Name of Child _____

Grade _____

Rater _____

Please rate this child according to the descriptions below by circling the appropriate number. The underlined 4 in the center of each row represents where the average child would fall on this item. Please do not hesitate to use the entire range of possible ratings.

- | | | | | | | | |
|--|----------------|---|---|----------|---|---|------------|
| 1. When the child promises to do something, can you count on him or her to do it? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | always | | | | | | never |
| 2. Does the child butt into games or activities even when he or she hasn't been invited? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | often |
| 3. Can the child deliberately calm down when he or she is excited or all wound up? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 4. Is the quality of the child's work all about the same or does it vary a lot? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | same | | | | | | varies |
| 5. Does the child work for long-range goals? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 6. When the child asks a question, does he or she wait for an answer, or jump to something else (e.g., a new question) before waiting for an answer? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | waits | | | | | | jumps |
| 7. Does the child interrupt inappropriately in conversations with peers, or wait his or her turn to speak? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | waits | | | | | | interrupts |
| 8. Does the child stick to what he or she is doing until he or she is finished with it? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 9. Does the child follow the instructions of responsible adults? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | always | | | | | | never |
| 10. Does the child have to have everything right away? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | no | | | | | | yes |
| 11. When the child has to wait in line, does he or she do so patiently? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 12. Does the child sit still? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 13. Can the child follow suggestions of others in group projects, or does he or she insist on imposing his or her own ideas? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | able to follow | | | | | | imposes |
| 14. Does the child have to be reminded several times to do something before he or she does it? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | always |
| 15. When reprimanded, does the child answer back inappropriately? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | always |

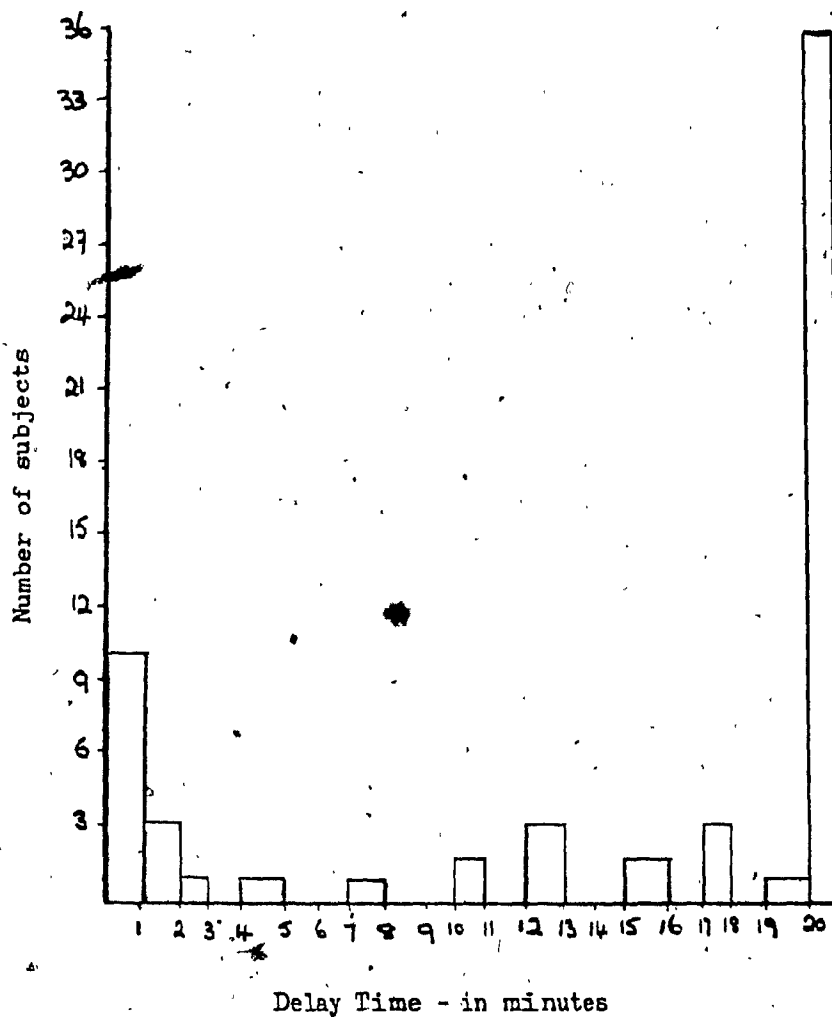
- | | | | | | | | |
|--|---------------|---|---|----------|---|---|----------|
| 16. Is the child accident prone? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | no | | | | | | yes |
| 17. Does the child neglect or forget regular chores or tasks? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | always |
| 18. Are there days when the child seems incapable of settling down to work? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | often |
| 19. Would the child more likely grab a smaller toy today or wait for a larger toy tomorrow, if given the choice? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | wait | | | | | | grab |
| 20. Does the child grab for the belongings of others? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | often |
| 21. Does the child bother others when they're trying to do things? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | no | | | | | | yes |
| 22. Does the child break basic rules? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | always |
| 23. Does the child watch where he or she is going? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | always | | | | | | never |
| 24. In answering questions, does the child give one thoughtful answer, or blurt out several answers all at once? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | one answer | | | | | | several |
| 25. Is the child easily distracted from his or her work or chores? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | no | | | | | | yes |
| 26. Would you describe this child more as careful or careless? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | careful | | | | | | careless |
| 27. Does the child play well with peers (follows rules, waits turn, cooperates)? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | yes | | | | | | no |
| 28. Does the child jump or switch from activity to activity rather than sticking to one thing at a time? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | sticks to one | | | | | | switches |
| 29. If a task is at first too difficult for the child, will he or she get frustrated and quite, or first seek help with the problem? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | seek help | | | | | | quit |
| 30. Does the child disrupt games? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | never | | | | | | often |
| 31. Does the child think before he or she acts? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | always | | | | | | never |
| 32. If the child paid more attention to his or her work, do you think he or she would do much better than at present? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | no | | | | | | yes |
| 33. Does the child do too many things at once, or does he or she concentrate on one thing at a time? | 1 | 2 | 3 | <u>4</u> | 5 | 6 | 7 |
| | one thing | | | | | | too many |

APPENDIX D

FIGURE 1 - DISTRIBUTION OF DELAY TIMES

FIGURE 1

Distribution of Delay Times



APPENDIX E

**TABLE OF CORRELATIONS BETWEEN DEPENDENT MEASURES FOR
TOTAL SAMPLE**

TABLE OF CORRELATIONS BETWEEN DEPENDENT MEASURES
FOR TOTAL SAMPLE

Correlation (Probability)	<u>Age</u>	<u>IQ</u>	<u>Delay</u>	<u>Knowledge</u>	<u>SCRS</u>
Age	--	.0200 (.400)	.2303 (.038)	.2541 (.025)	.0906 (.350)
IQ		--	.0355 (.394)	.1302 (.161)	-.0688 (.387)
Delay			--	.0671 (.305)	.4716 (.018)
Knowledge				--	-.1024 (.334)

*Similar correlations were obtained using the reduced 10-item questionnaire. Data available from the author.